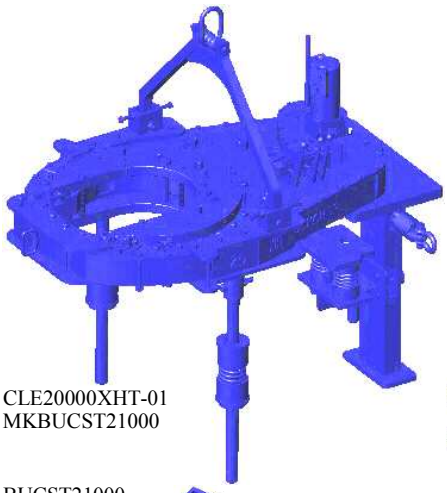
SUPERIOR
Manufacturing & Hydraulics

TECHNICAL MANUAL

20" CLINCHER® XHT COMBO TONG

AND

21" LOCKJAW™ BACKUP



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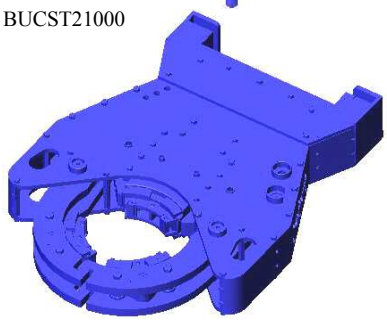

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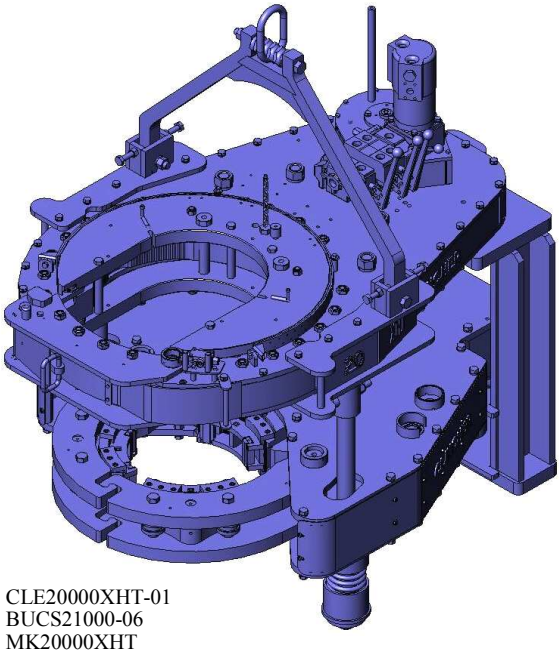

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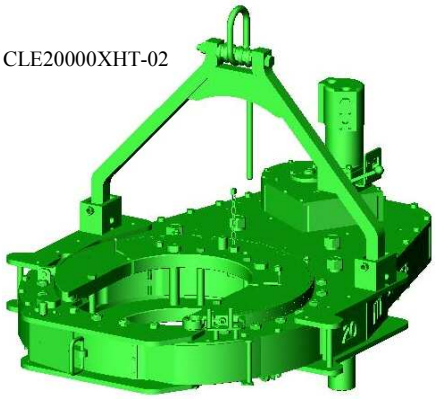

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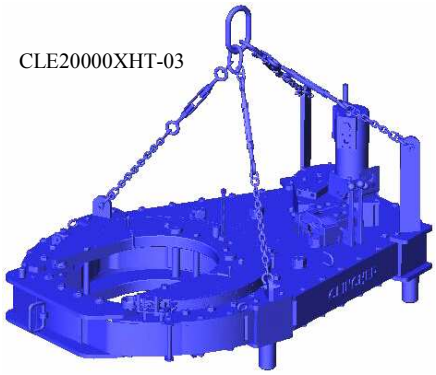

CLE20000XHT-03

COVERS

TONG MODELS

CLE20000XHT-01, -02, -03, -04

BACKUP MODELS

BUCS21000-06 & BUCST21000

HANGER ASSEMBLIES

RH20002 (COMPONENT OF MK20000XHT)

RH21000 (COMPONENT OF MKBUCST21000)

4225 Highway 90, East
Broussard, Louisiana 70518
Phone: (337) 837-8847
Fax: (337) 837-8839
www.superior-manf.com

Published 09/2005

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This manual is not a controlled document and is subject to revision without notice. To receive updates and insure you have access to the latest information concerning the 20" XHT CLINCHER® Tong with 21" LOCKJAW™ Backup, we request you complete this form and return the lower half to SUPERIOR Manufacturing and Hydraulics by mail or facsimile. Access to our manuals can also be acquired through our web site www.superior-manf.com. Select the tab 'CLINCHER® Products', select the equipment from the list to get Specs page, select the tab 'Download Manual'.

Name: _____
Company: _____
Address: _____
Address: _____
City: _____ **State:** _____
Postal Code: _____ **Country:** _____
Telephone: _____ **Fax:** _____

Tong Model No.: _____ **Serial No.:** _____
Backup Model No.: _____ **Serial No.:** _____
Assembly Date: _____

20" CLINCHER® XHT Combo Tong & 21" LOCKJAW™ Backup Technical Manual Registration Form

Name: _____
Company: _____
Address: _____
Address: _____
City: _____ **State:** _____
Postal Code: _____ **Country:** _____
Telephone: _____ **Fax:** _____

Tong Model No.: _____ **Serial No.:** _____
Backup Model No.: _____ **Serial No.:** _____
Assembly Date: _____

Return To:

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REVISION TABLE

Section	*Page*	*Date*	*Description*
1	1	12/06	Corrected wire cable size & breaking strength.
2	1	12/06	Added illustration of tong & backup.
	4		Corrected Specs - Tong Handle Length.
5	1	12/06	A) & D) Corrected wire cable size & breaking strength.
9	5	12/06	Revised illustration Mid Idler Assy.
12	1	12/06	Corrected Part No. & Rating of Torque Gauge.
Cover & Title Pg.	Cover & Title Pg	02/07	Added Tong Model's CLE20000XHT-02 & -03. Added Backup Model BUCST21000 and Hanger Assembly RH21000.
2	4	02/07	Added equipment model numbers to Specs.
	6-10		Added Specs for Tong CLE20000XHT-02 & CLE20000XHT-03. Added dimensional illustrations for Tong CLE20000XHT-02 & CLE20000XHT-03. Added Specs for Tong CLE20000XHT-01 with Backup BUCST21000 and Mounting Kit MKBUCST21000, and added dimensional illustration.
3	3-4	02/07	Corrected typo on PN for dovetail insert 5" x 5/8" (DTI1632 to DTI1633).
9	1, 2.1-2.2, 14-16, 24.1-24.2	02/07	Added illustrations for Tong CLE20000XHT-02 & CLE20000XHT-03, Motor Gear Box Assy. 20188, Bail Assy. 26728 & Bridle Assy. 20150. Combined Motor Assy. Sht. 1 & 2 into 1 sheet. Revised Ring Gear Assy. 20058
10	1, 2.1	02/07	Added illustrations for Backup BUCST21000 & Mounting Kit MKBUCST21000, Leg Assy. MK20006-01, Rear Hanger Assy. RH21000, & Bail Assy. 26728.
	13-14		
	11-12		Corrected typo's on illustrations, model numbers had too many zero's (0).
11	3	02/07	Added illustration for Lift Cylinder LCR500.
12	1, 9-30	02/07	Added SM85-56-T Tension Load Cell and Tech. Info. for Tension Torque System.
14	19-34	02/07	Added valve information.
9	17	03/08	Revised illustration Cage Plate Assy. 20068-01.
10	4	03/08	Revised illustration Backup Cylinder Assy. BUCS21006-01.

20" CLINCHER® XHT COMBO TONG AND 21" LOCKJAW™ BACKUP

HAZARD WARNING

Nomenclature used in this manual:

WARNING concerns an operating procedure or practice that, if not strictly observed, can result in injury to personnel or loss of life.

Caution concerns an operating procedure or practice that, if not strictly observed, can result in damage to or destruction of equipment.

Note concerns an operating procedure or practice that needs highlighting.

CLINCHER® Tongs and Backups are manufactured to provide a means of making up or breaking out high torque tubular connections. They utilize high pressure hydraulic fluid power which can cause the tong to move suddenly and with great force if the tong is not properly rigged up and operated. **CLINCHER®** Tongs and Backups contain rotating and reciprocating parts which can severely or fatally injure personnel who are operating, repairing, or near this equipment during its operation. **WARNING: Tongs and Backups are not to be operated by untrained personnel or personnel with diminished physical or mental capacity. No work of any type, including changing of dies, is to be carried out while the tong and backup are connected to any hydraulic power unit.**

CLINCHER® Tongs and Backups are heavy tools. They should be suspended from a secure, high strength 1" IWRC minimum diameter wire cable with a 51.7 ton minimum breaking strength. The wire rope should be hung as close to the center of the wellbore as possible, without interfering with drilling equipment operation, to allow the tong to be readily swung into the working position. Vertical position control should be achieved by means of a **CLINCHER®** hydraulically operated lift cylinder/spring hanger. **WARNING: Users must insure the entire suspension system including cables, rig mounting points, lift cylinders, tong lifting brackets/bridles, winches, pulleys, counter weights, etc., are capable of handling the static weight of the tong plus any loads which could be transferred to it during the makeup or breakout process PLUS any shock loads which may be seen during operation. This system must readily allow downward movement equal to a minimum of the thread makeup distance to avoid overloading the suspension system and/or damage to equipment.**

A 1 1/2" IWRC minimum diameter wire cable with a 114 ton minimum breaking strength should be attached at a 90 degree angle to the tong and at the same level to insure proper readout of torque indicator. A SNUBBING LINE should always be attached even when an integral backup is in use to provide additional safety in the event of a backup slippage.

WARNING: Users must provide a means of safely controlling the tong movements in all directions when it is in use. Failure to account for the its size, weight, movement and the amount of torque developed could result in personnel injury or death.

CLINCHER® Tongs and Backups utilize high pressure hydraulic fluids. Portions of the tong and backup, control valves, hydraulic lines and cylinders may contain high pressure fluid even when the power unit is de-energized and the fluid supply hoses are disconnected. During normal operation the temperature of the hydraulic fluids as well as hoses, piping, valves, etc., can rise to a level which can cause burns. **WARNING: Personal protective gear including safety glasses, face shields, protective gloves and protective clothing must be worn to guard against the hazards of high pressure fluids. Tight fitting clothing is required to prevent entanglement in rotating components. These tools should be serviced by thoroughly trained and qualified hydraulic technicians using procedures to safely insure hydraulic pressure is bled from these circuits.**

The **CLINCHER®** Tong is equipped with a door interlock system which prevents tong rotation whenever the door is open. This system is to be tested before each mobilization and at every shift change. Should this system be determined to be inoperative, the tong is to be removed from service and tagged as ***in-operative*** until repairs are made. **CAUTION:** Operating the tong with the door in the open position could result in severe damage to the equipment and will void all manufacturer warranties. **WARNING: Operating the tong with the door open by means of a defective or bypassed door interlock system exposes the operator and nearby personnel to potentially fatal hazards.**

No attempt should be made to operate the **CLINCHER®** Tong and Backup for any purpose other than which it is intended. This system is capable of generating very large clamping forces and torsional loads which, if improperly applied or controlled, could result in damage to the tubular, to the tong or could possibly result in injury or death of personnel. Do not attempt to operate the unit without correct dies and the proper size tubular being in the tong. See Section 3 for more information concerning the selection and use of dies. **CAUTION: Operating this equipment without the correct size, type and orientation of dies can result in damage to the equipment or tubulars being handled.**

HYDRAULIC PRODUCT SAFETY

WARNING: Valve lever (spool) may "stick" (not center) under certain conditions allowing the hydraulic equipment to continue to operate and could cause serious injury, death or equipment failure.

VALVE SAFETY: Read and follow instructions carefully. Failure to observe instructions and guidelines may cause serious injury, death or equipment failure. A sticking valve (spool bind) may be caused by one or more of the following factors:

DIRTY OIL: Oil must be filtered to a minimum of 25 microns. Filters should be changed regularly - spin-on types after 50 hours of initial use and then after every two hundred fifty hours of use. Use of a condition indicator is recommended. Consult your tractor or implement owner's manual for filtration and changing recommendations for internal systems.

OIL REQUIREMENTS: Premium quality anti-wear type oil with a viscosity between 100 and 200 SSU at operating temperatures. Certain synthetic oils may cause spool seals to swell and the valve to stick. If in doubt, call CROSS Engineering.

IMPROPER HOOK UP OR MOUNTING: Always use the proper size fittings. Hook up "in" & "out" as noted on the valve body. Do not overtorque pipe fittings. Mounting surfaces should be flat and care should be used when tightening mounting bolts. Over-tightened bolts can cause spool bind and casting breakage. When hooking a valve in series, always use a power beyond sleeve. Consult your tractor or implement manual to make sure you have the proper quick disconnect line connected to the inlet of the remote valve.

MISAPPLICATION: Always use the proper valve for the job. CONVERTA, CD, CS or CA valves should never be used for metered heavy load lifting - loaders or similar applications. Use an open center valve for open center applications and a closed center valve for closed applications. If in doubt, check with your tractor dealer. Contact CROSS if the valve allows the hydraulic equipment to creep excessively.

MAINTENANCE: Make sure all bolts are tightened and torqued to the recommended specification. Bent or broken parts should not be used. Replace immediately. Always use exact replacements. Always protect valve spool from paint overspray.

Faulty quick disconnects can cause high back pressures and sticking spools. Check quick disconnects periodically to make sure they are functioning properly. If valve spool does not center or appears to stick, do not use!

PUMPS & MOTORS SAFETY:

A relief or bypass in your hydraulic system is necessary to prevent pump from breakage due to overpressurization. Use correct fittings and proper oil as noted in the technical service manual packed with each unit. Change oil as recommended by your implement or tractor manufacturer.

CYLINDER SAFETY:

Check clevis clearances before, during and after extending the cylinder and before using the cylinder under pressure to avoid possible injury, or bent or broken rods caused by binding. Never operatea cylinder above recommended pressures. Never use a cylinder as a safety device when trans-porting equipment.

PINHOLE LEAKS:

If you observe a pinhole leak, discontinue use of the component. If oil has penetrated your skin or contacted your eye, seek medical attention immediately!

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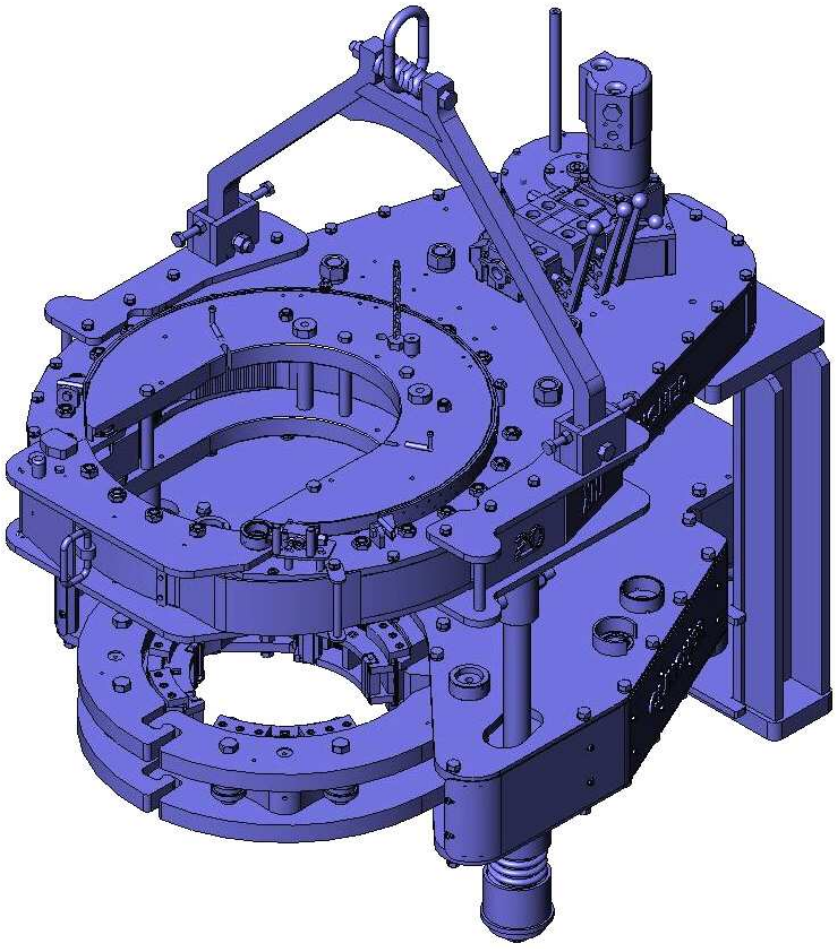

20" CLINCHER® COMBO TONG
AND
21" LOCKJAW™ BACKUP

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CLINCHER® COMBO TONG

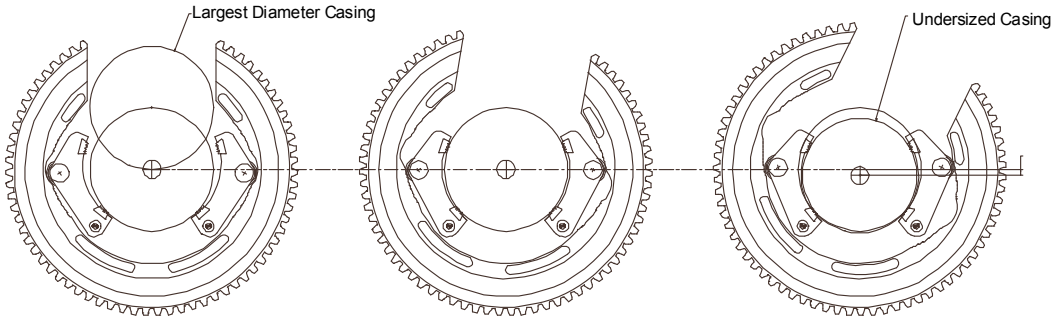
The **CLINCHER®** "Combo" Tong is a unique tool which accepts pivoting jaws for large diameter casing applications. When dressed with an optional jaw adapter[1], this tong also accepts sliding jaws for drill pipe and tubing applications.

Pivoting jaws provide large diameter gripping capabilities in a "narrow jaw" geometry allowing the overall width of the tong to be minimized. Pivoting jaws are circular segments which are pinned at one end. The wide angle between jaw inserts make them ideally suited for thin walled tubulars such as casing. When driven by the ring gear's cam, these jaws rotate about a pivot pin until the die inserts in the jaws contact the tubular. The geometry of these rotating jaws have limited ability to deal with tubulars which are somewhat smaller than the nominal jaw size because they must rotate beyond their normal design limits. This additional rotation can push the pipe's centerline off the tong's centerline causing eccentric rotation and questionable torque turn graphs.

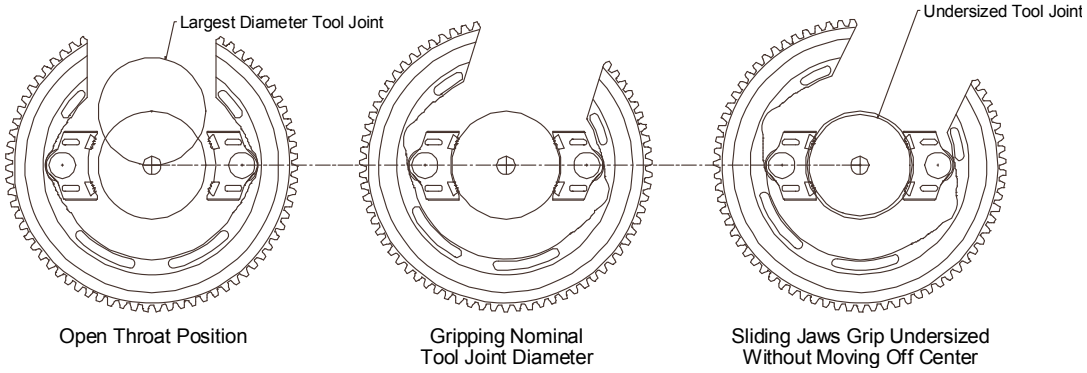
Sliding jaws move radially from the open position until they contact the pipe or tool joint. They are typically thicker than pivoting style joints, so tongs exclusively using this style jaw are typically larger than equivalent sized tongs using pivoting jaws. When dressed with dovetail dies in a "V" configuration, sliding jaws are capable of accommodating wide tool joint diameter variations under nominal jaw size. This Combo Tong features our constant radial load ring gear cam design[2] allowing the drill pipe jaws to grip tool joints as much as 1/2 inch smaller in diameter than the nominal drill pipe jaw size. These sliding jaws are available with splines[3] in standard and low friction[4] types for small diameter casing and tubing applications where the use of fine tooth steel dies is desirable. Applications requiring chrome alloys can be handled using **GRIT FACE™** Dies[5] or non-marking aluminum dies.

(1) US and foreign patents pending.
(2) US Patent 4,986,146; Canada 2,012,683
(3) US Patents 4,576,067 & 5,911,796
(4) US Patent 5,819,605; Canada 2,289,199; EU 98923644.3
(5) US Patent 6,378,399; other US & foreign patents pending

PIVOTING STYLE JAWS



SLIDING STYLE JAWS


Largest Diameter Tool Joint
Undersized Tool Joint
Open Throat Position
Gripping Nominal Tool Joint Diameter
Sliding Jaws Grip Undersized Without Moving Off Center

DESCRIPTION and APPLICATION

The **CLINCHER®** Tong and Backup system is an "open-throat" design which can handle tubulars as small as 5 inches to as large as 20 inches in diameter. The Backup can accommodate tubulars as large as 21 inches. This system features two (2) jaws in the Tong and three (3) in the Backup which encircle the pipe. Wrap Around jaws and dies, combined with our low friction jaw technology and constant radial load cam system provide exceptional gripping capabilities with reduced pipe deformation, stress, and marking. Using our non-marking aluminum die system or **GRIT FACE™** dies in the Tong and Backup will now allow stainless steel corrosion resistant alloys (CRA) to be run as quickly and easily as a traditional tong runs conventional steel tubulars.

Notable Features and Benefits

Low Friction Jaws	increases cam angle efficiency to allow use of aluminum dies
Splined Die System	aligns the die with the tubular and more evenly distributes radial load, essentially wrapping the die around the tube reduces pipe stress, deformation, and minimizes marking
Constant Cam Angle	insures an adequate radial load is available regardless of relative rotation to enhance performance on undersized pipe
Die Retention Method	provides an enhanced method of preventing equipment damage and die loss if the pipe is inadvertently moved while the tong is still gripping the pipe
Self Adjusting Brake	eliminates need to manually adjust brake bands to compensate for normal wear

In addition to these unique features listed above, the **CLINCHER®** Tong and Backup System is also equipped with numerous standard features including:

Door Interlock	prevents tong ring gear rotation whenever the tong door is open but allows control and operation of the lift cylinder at all times
Encoder Adapter	accepts customer's turns encoder to signal to a torque/turn computer
Pressure Control Valve	adjustable pressure control valves allow the customer to limit the amount of pressure applied and torque developed

The features described above are covered by US and foreign patents or pending US and foreign patents.

Tong Application

The cage plate assembly and jaws are rotationally restrained by the cage plate brake system. Relative rotation between the ring gear and the cage plate assembly forces the jaws to grip or release the pipe. During a jaw closing cycle, the jaws advance until they contact the pipe. After completing the makeup or breakout cycle, the jaws are opened by reversing the tong motor to drive the ring gear and cam surfaces in the opposite direction until the reversing pin contacts the ring gear shoulder. Springs are used to return the jaws to their fully open position.

Backup Application

The **CLINCHER® LOCKJAW™** Backup has an "open throat" design with three jaws that encircle the pipe. The front jaws are Cam operated by the rear cylinder. Once locked on the pipe, pressure is locked in the backup cylinder by a load holding valve. When opening the backup jaws, the cylinder operation is reversed to retract the rear die and unlock the jaws. Springs move the front jaws to their fully open position.

SPECIFICATIONS
TONG AND BACKUP

TONG MODEL CLE20000XHT-01
BACKUP MODEL BUCS21000-06
MOUNTING KIT MODEL MK20000XHT

Maximum Torque	85,000 ft.lbs. / 115,200 Nm	
Maximum Operating Pressure / Tong & Backup	2,500 psi / 170 bar	
RPM @ 60 GPM / 227 LPM **Manual Gearbox with 2-Speed Hydraulic Motor** **High Gear / High Speed** **High Gear / Low Speed** **Low Gear / High Speed** **Low Gear / Low Speed**	 5,000 ft.lbs. 10,000 ft.lbs. 42,500 ft.lbs. 85,000 ft.lbs.	 26 RPM 13 RPM 4 RPM 2 RPM
Handle Length / Tong **Handle Length / Backup**	52" / 132 cm 48" / 122 cm	
Overall Length / Tong **Overall Length / Backup** **Overall Length / Tong, Backup & Mounting Kit**	80" / 203 cm 73" / 185 cm 84" / 213 cm	
Overall Width / Tong without Handles **Overall Width / Tong with Handles** **Overall Width / Backup**	48" / 122 cm 58" / 146 cm 56 1/4" / 143 cm	
Overall Height / Tong, Backup & Mounting Kit	88" / 224 cm	
Weight / Tong **Weight / Backup** **Combined Weight / Tong, Backup & MK** **Weight / Drill Pipe Jaw Adapters**	3200 lbs. / 1451 kg 2800 lbs. / 1270 kg 7500 lbs. / 3401 kg 500 lbs. / 227 kg	
Tong Gripping Range / Pivoting Jaws **Drill Pipe Jaws** **Backup Gripping Range**	7 5/8" thru 20" 5" thru 9 5/8" 5" thru 21"	

Operates using Dovetail Strip Dies, Steel Tooth Wrap Around Dies, **GRIT FACE™** Wrap Around Dies, and Aluminum Wrap Around Dies.

Note: Smaller sizes and all Aluminum Dies may require Low Friction Rollers and LIMITED torques.

Tong Standard Equipment:

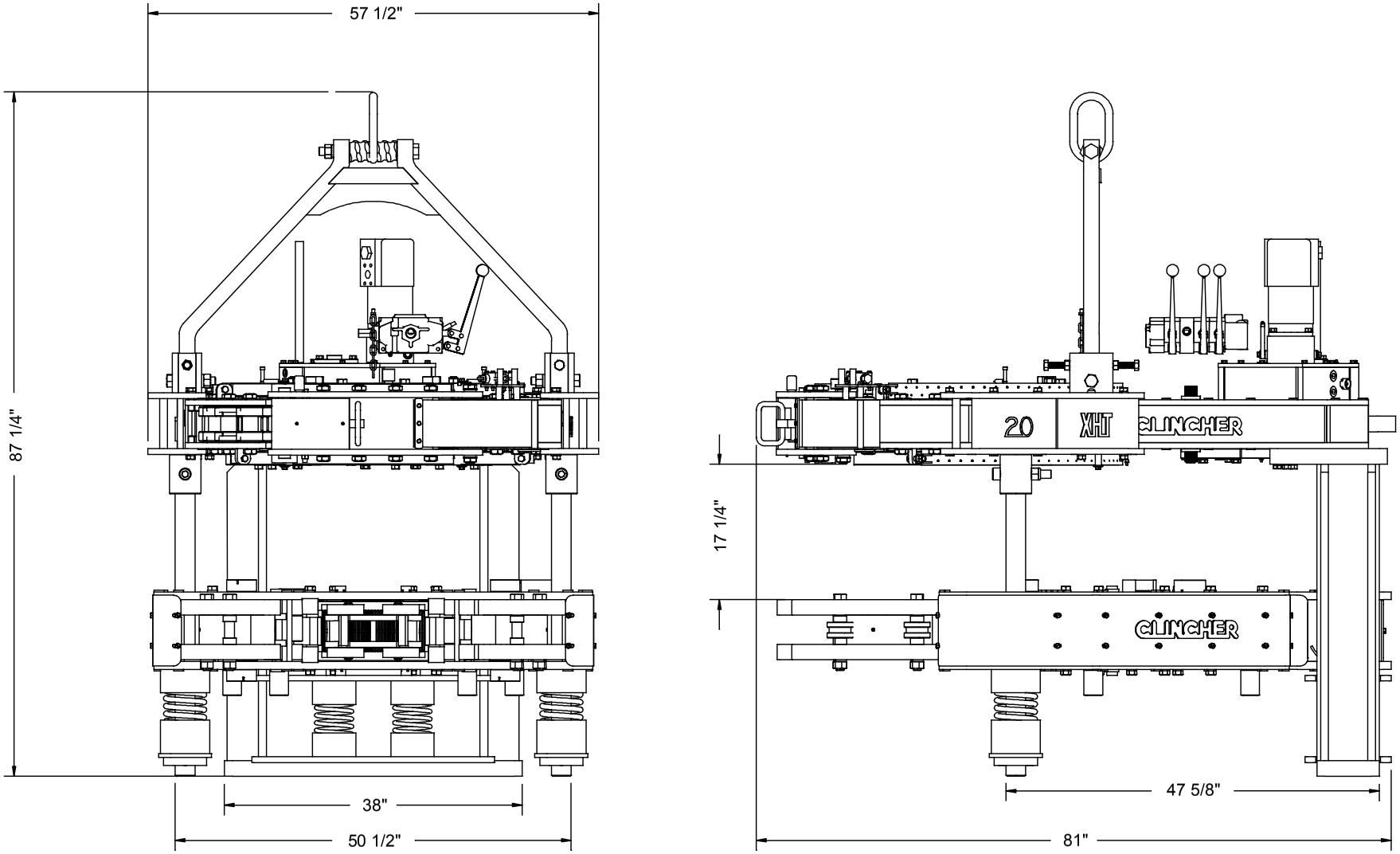
- Door Interlock
- Two Speed Hydraulic Motor
- Two Speed Gear Box

Backup Standard Equipment:

- Door Crush Interlock
- Clamping Pressure Control Valve

Optional Equipment:

- Electronic Solenoid Dump Valve
- Shipping Stand, or Skid



20" XHT TONG WITH 21" DP BACKUP DIMENSIONS

CLE20000XHT-01 with BUCS21000-06 with MK20000XHT

SUPERIOR Manufacturing & Hydraulics
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BROUSSARD, LA 70518
(318) 837-8847

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REV. #	LOG #	DATE

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TONG SPECIFICATIONS

TONG MODEL CLE20000XHT-02

Maximum Torque	85,000 ft.lbs. / 115,200 Nm	
Maximum Operating Pressure / Tong	2,500 psi / 170 bar	
RPM @ 60 GPM / 227 LPM **Manual Gearbox with 2-Speed Hydraulic Motor** **High Gear / High Speed** **High Gear / Low Speed** **Low Gear / High Speed** **Low Gear / Low Speed**	 5,000 ft.lbs. 10,000 ft.lbs. 42,500 ft.lbs. 85,000 ft.lbs.	 26 RPM 13 RPM 4 RPM 2 RPM
Handle Length / Tong	52" / 132 cm	
Overall Length / Tong CLE20000XHT-02	81.5" / 207 cm	
Overall Width / Tong with Handles	57.5" / 146 cm	
Overall Height / Tong w/Bail	51.3" / 130 cm	
Weight / Tong **Weight / Drill Pipe Jaw Adapters**	3625 lbs. / 1644 kg 500 lbs. / 227 kg	
Tong Gripping Range / Pivoting Jaws **Drill Pipe Jaws**	7 5/8" thru 20" 5" thru 9 5/8"	

Tong Standard Equipment:
- Door Interlock
- Two Speed Hydraulic Motor
- Two Speed Gear Box
- Bail

Optional Equipment:
- Electronic Solenoid Dump Valve
- Shipping Stand, or Skid

Operates using Dovetail Strip Dies, Steel Tooth Wrap Around Dies, **GRIT FACE™** Wrap Around Dies, and Aluminum Wrap Around Dies. Note: Smaller sizes and all Aluminum Dies may require Low Friction Rollers and LIMITED torques.

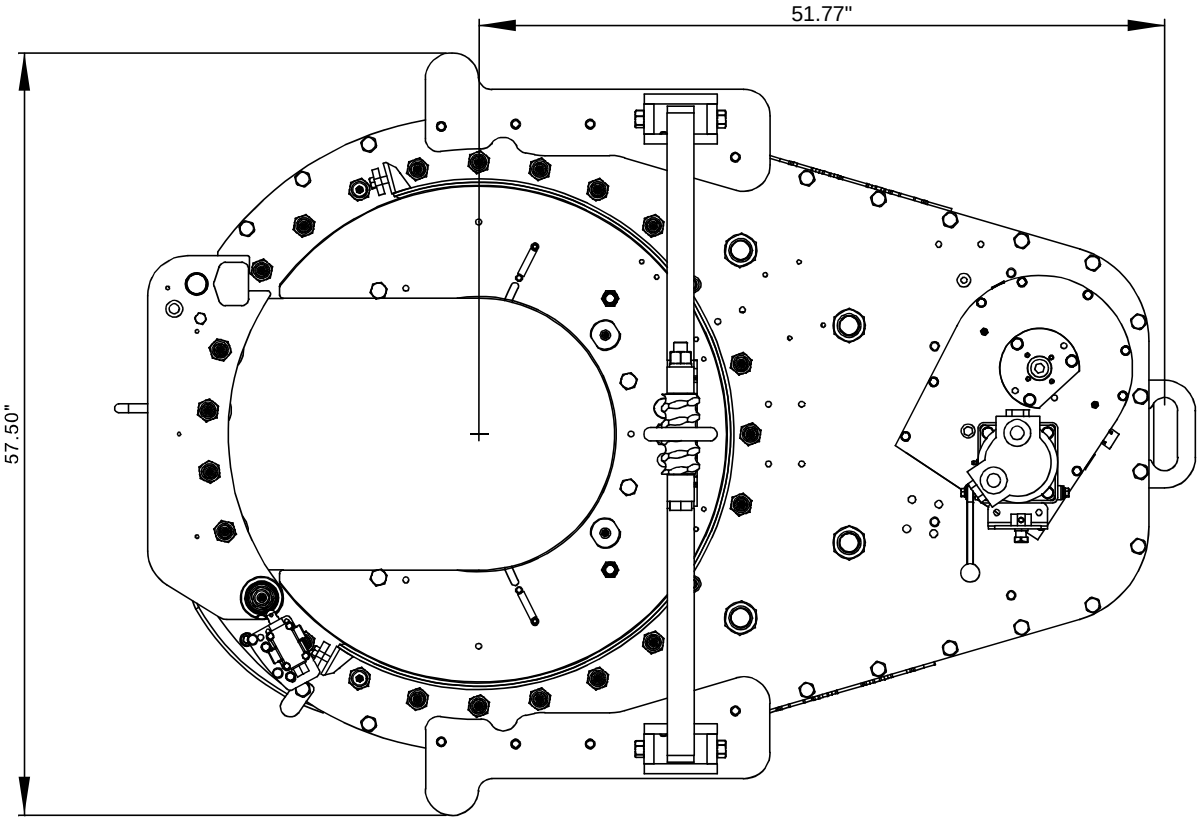
TONG MODEL CLE20000XHT-03

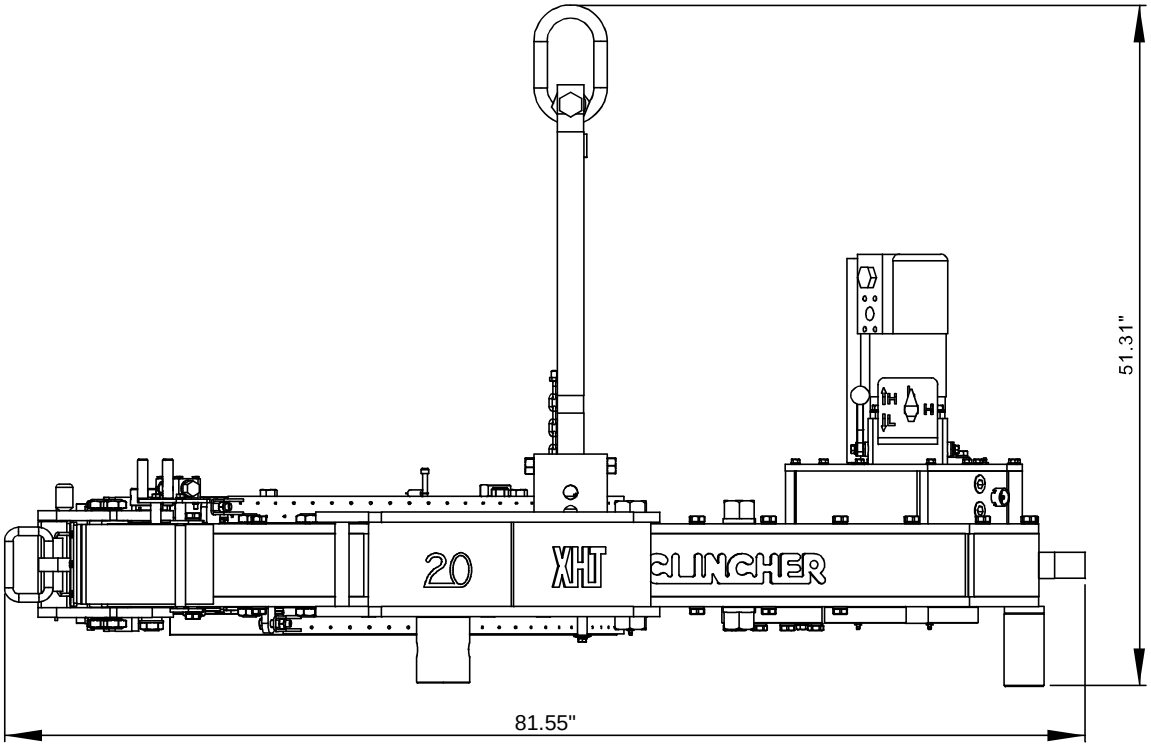
Maximum Torque	85,000 ft.lbs. / 115,200 Nm	
Maximum Operating Pressure / Tong	2,500 psi / 170 bar	
RPM @ 60 GPM / 227 LPM **Manual Gearbox with 2-Speed Hydraulic Motor** **High Gear / High Speed** **High Gear / Low Speed** **Low Gear / High Speed** **Low Gear / Low Speed**	 5,000 ft.lbs. 10,000 ft.lbs. 42,500 ft.lbs. 85,000 ft.lbs.	 26 RPM 13 RPM 4 RPM 2 RPM
Handle Length / Tong	52" / 132 cm	
Overall Length / Tong CLE20000XHT-03	81.5" / 207 cm	
Overall Width / Tong with Padeye Foot Brackets	50" / 127 cm	
Overall Height / Tong w/Bridle	32.7" / 83 cm	
Weight / Tong **Weight / Drill Pipe Jaw Adapters**	3550 lbs. / 1610 kg 500 lbs. / 227 kg	
Tong Gripping Range / Pivoting Jaws **Drill Pipe Jaws**	7 5/8" thru 20" 5" thru 9 5/8"	

Tong Standard Equipment:
- Door Interlock
- Two Speed Hydraulic Motor
- Two Speed Gear Box
- Bridle

Optional Equipment:
- Electronic Solenoid Dump Valve
- Shipping Stand, or Skid

Operates using Dovetail Strip Dies, Steel Tooth Wrap Around Dies, **GRIT FACE™** Wrap Around Dies, and Aluminum Wrap Around Dies. Note: Smaller sizes and all Aluminum Dies may require Low Friction Rollers and LIMITED torques.





20" XHT TONG DIMENSIONS

CLE20000XHT-02

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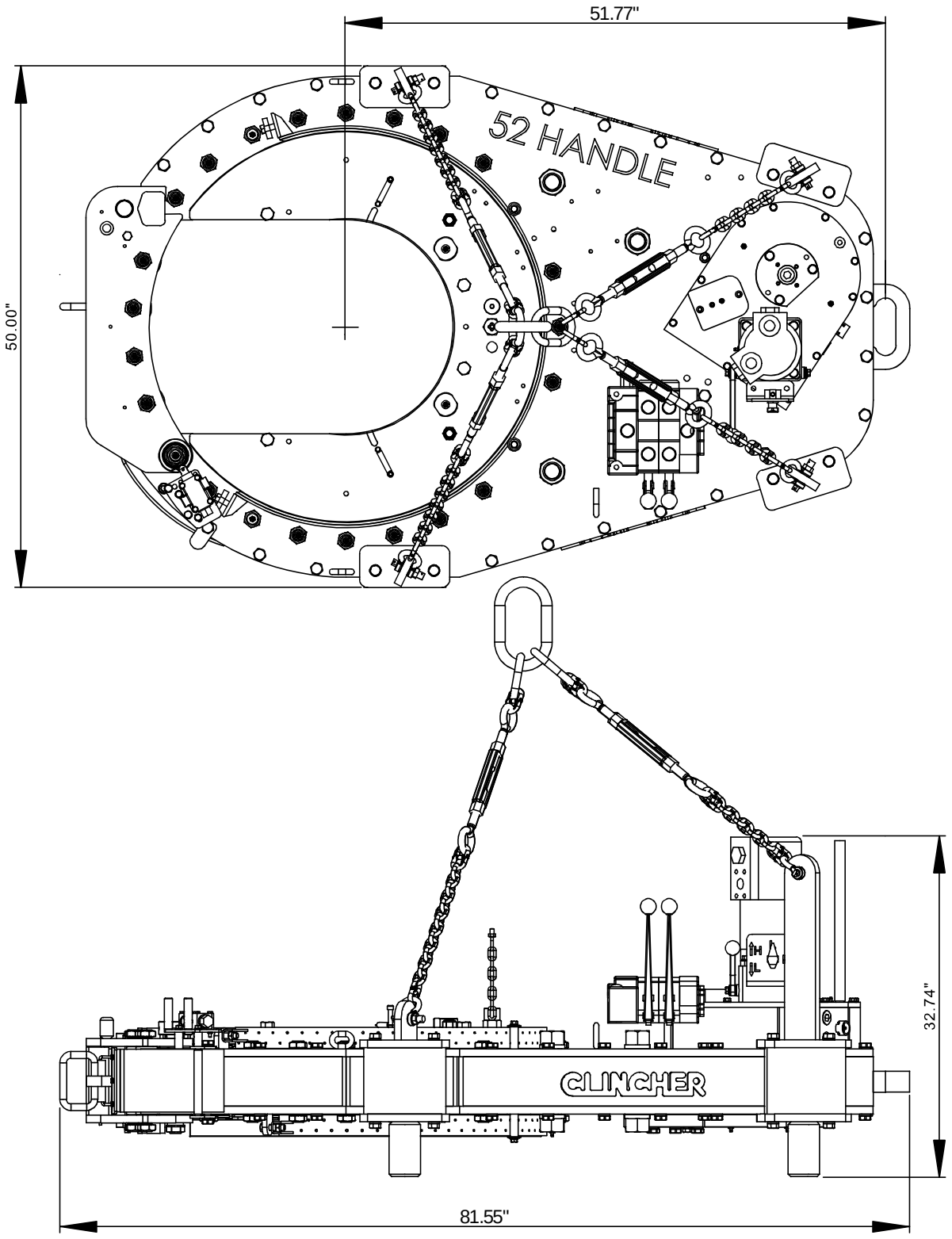

20" XHT TONG DIMENSIONS

CLE20000XHT-03

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
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TONG SPECIFICATIONS

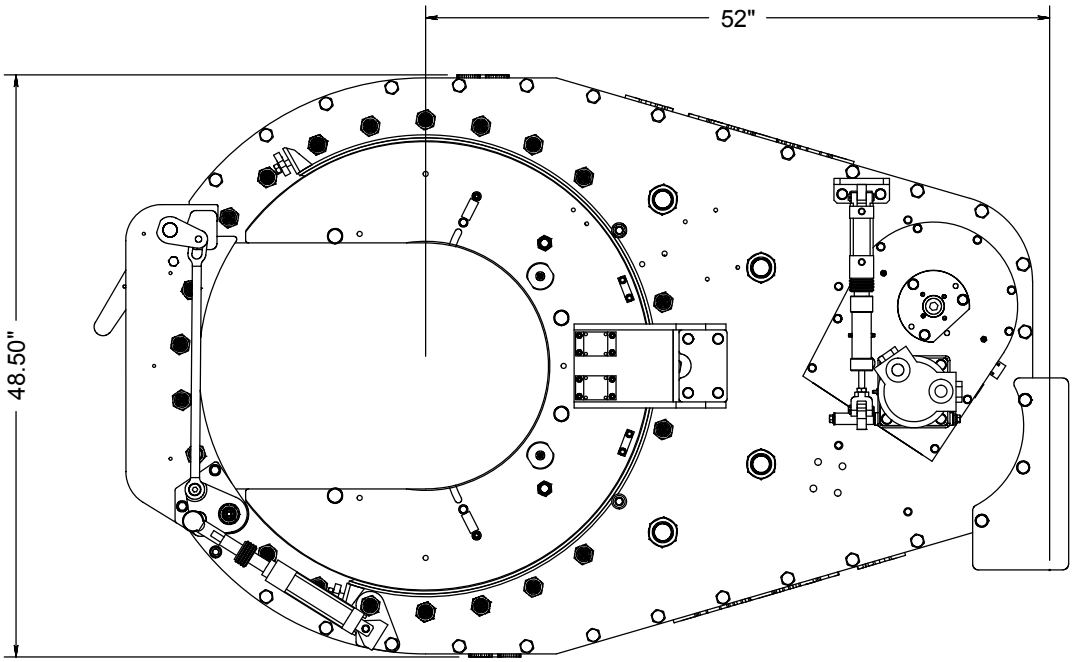
TONG MODEL CLE20000XHT-04

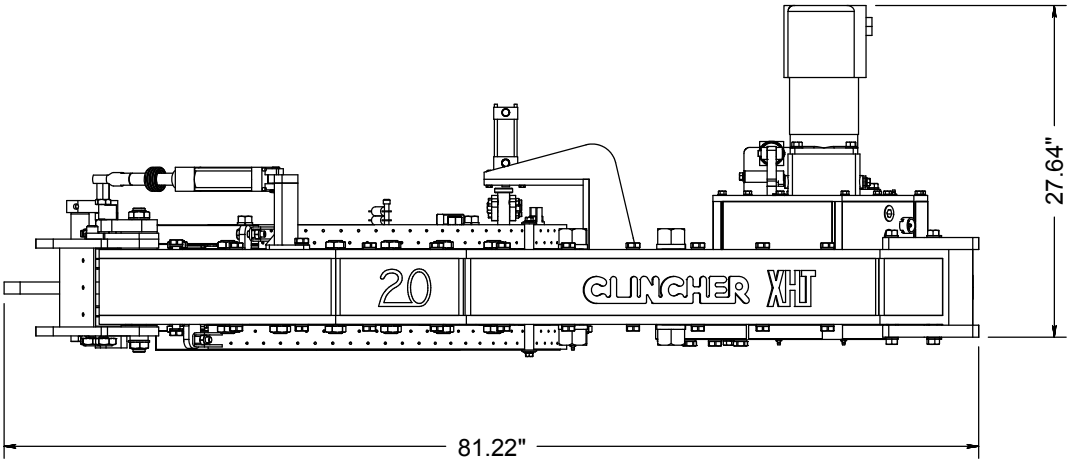
Maximum Torque	85,000 ft.lbs. / 115,200 Nm	
Maximum Operating Pressure / Tong	2,500 psi / 170 bar	
RPM @ 60 GPM / 227 LPM **Manual Gearbox with 2-Speed Hydraulic Motor** **High Gear / High Speed** **High Gear / Low Speed** **Low Gear / High Speed** **Low Gear / Low Speed**	 5,000 ft.lbs. 10,000 ft.lbs. 42,500 ft.lbs. 85,000 ft.lbs.	 26 RPM 13 RPM 4 RPM 2 RPM
Handle Length / Tong	52" / 132 cm	
Overall Length / Tong CLE20000XHT-04	81.2" / 206 cm	
Overall Width / Tong	48.5" / 123 cm	
Overall Height / Tong	27.6" / 70 cm	
Weight / Tong **Weight / Drill Pipe Jaw Adapters**	3550 lbs. / 1610 kg 500 lbs. / 227 kg	
Tong Gripping Range / Pivoting Jaws **Drill Pipe Jaws**	7 5/8" thru 20" 5" thru 9 5/8"	

Tong Standard Equipment:
- Door Interlock
- Two Speed Hydraulic Motor
- Two Speed Gear Box
- Bridle

Optional Equipment:
- Electronic Solenoid Dump Valve
- Shipping Stand, or Skid

Operates using Dovetail Strip Dies, Steel Tooth Wrap Around Dies, **GRIT FACE™** Wrap Around Dies, and Aluminum Wrap Around Dies. Note: Smaller sizes and all Aluminum Dies may require Low Friction Rollers and LIMITED torques.





20" XHT REMOTE TONG DIMENSIONS

CLE20000XHT-04

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SPECIFICATIONS
TONG AND BACKUP

TONG MODEL CLE20000XHT-01
BACKUP MODEL BUCST21000
MOUNTING KIT MODEL MKBUCST21000

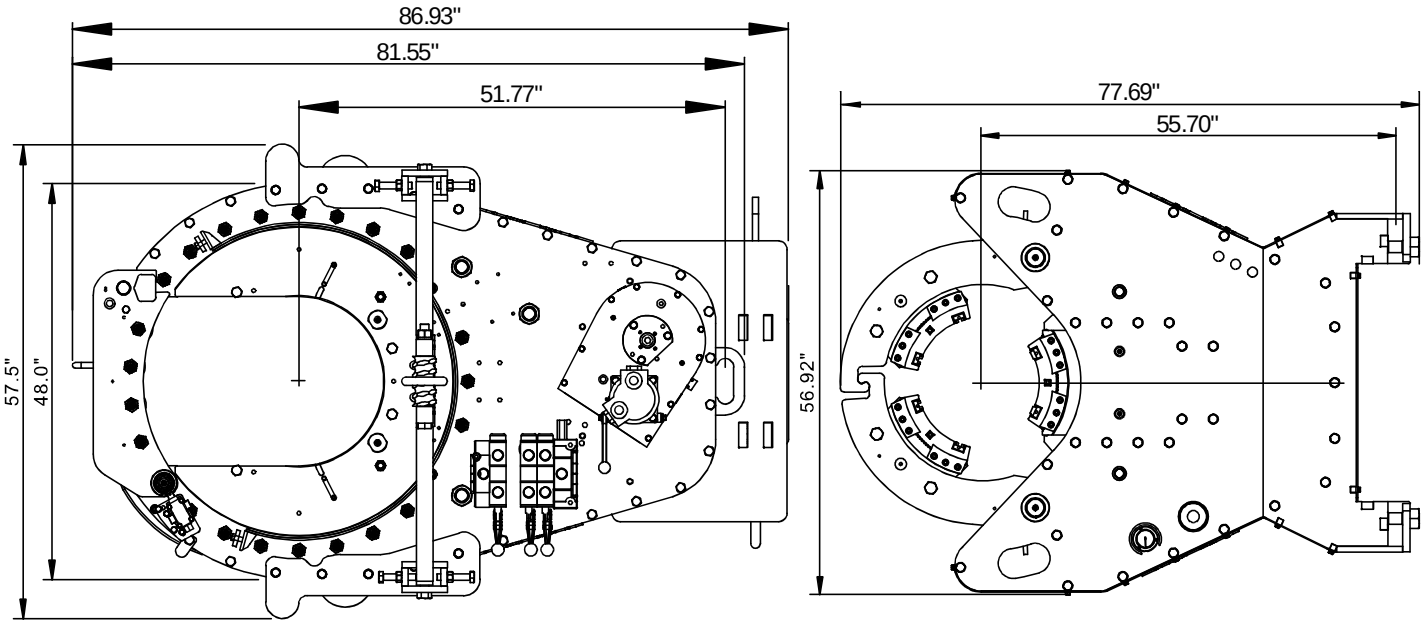
Maximum Torque	85,000 ft.lbs. / 115,200 Nm	
Maximum Operating Pressure / Tong	2,500 psi / 170 bar	
RPM @ 60 GPM / 227 LPM **Manual Gearbox with 2-Speed Hydraulic Motor** **High Gear / High Speed** **High Gear / Low Speed** **Low Gear / High Speed** **Low Gear / Low Speed**	 5,000 ft.lbs. 10,000 ft.lbs. 42,500 ft.lbs. 85,000 ft.lbs.	 26 RPM 13 RPM 4 RPM 2 RPM
Handle Length / Tong **Handle Length / Backup**	52" / 132 cm 56" / 142 cm	
Overall Length / Tong **Overall Length / Backup** **Overall Length / Tong, Backup & Mounting Kit**	81.5" / 207 cm 77.7" / 197 cm 86.9" / 221 cm	
Overall Width / Tong without Handles **Overall Width / Tong with Handles** **Overall Width / Backup**	48" / 122 cm 57.5" / 146 cm 56.9" / 145 cm	
Overall Height / Tong, Backup & Mounting Kit	92.7" / 235 cm	
Weight / Tong **Weight / Tong w/Bail** **Weight / Backup** **Combined Weight / Tong, Backup & MK** **Weight / Drill Pipe Jaw Adapters**	3200 lbs. / 1451 kg 3625 lbs. / 1644 kg 3100 lbs. / 1406 kg 7800 lbs. / 3538 kg 500 lbs. / 227 kg	
Tong Gripping Range / Pivoting Jaws **Drill Pipe Jaws** **Backup Gripping Range**	7 5/8" thru 20" 5" thru 9 5/8" 5" thru 21"	

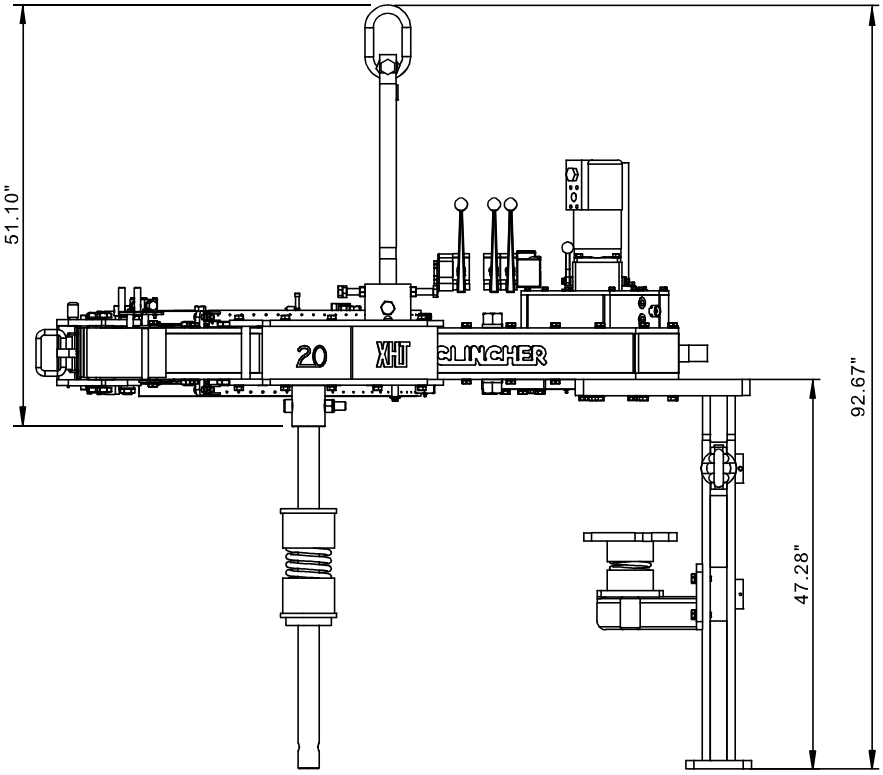
Tong Standard Equipment:
- Door Interlock
- Two Speed Hydraulic Motor
- Two Speed Gear Box
- Bail

Optional Equipment:
- Electronic Solenoid Dump Valve
- Shipping Stand, or Skid

Backup Standard Equipment:
- Door Crush Interlock
- Clamping Pressure Control Valve

Operates using Dovetail Strip Dies, Steel Tooth Wrap Around Dies, **GRIT FACE™** Wrap Around Dies, and aluminum Wrap Around Dies. Note: Smaller sizes and all Aluminum Dies may require Low Friction Rollers and LIMITED torques.





20" XHT TONG WITH 21" LJ BACKUP DIMENSIONS

CLE20000XHT-01 WITH BUCST21000
AND MKBUCST21000

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
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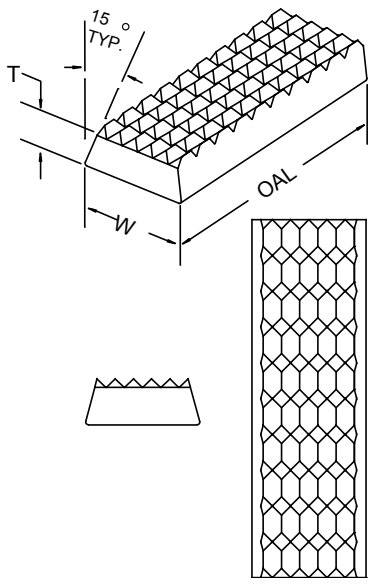
CLINCHER® DIES

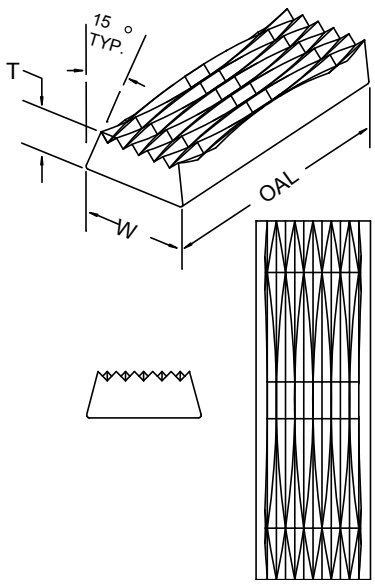
Many **CLINCHER®** Tongs and Backups utilize jaws and/or adapters which accept Dovetail Inserts (AKA Pencil Dies or Strip Dies) to effectively grip tubulars. Jaw systems and jaw adapters are also available which accommodate Wrap-Around Fine Tooth Steel Dies, **GRIT FACE™** Dies and Aluminum Dies.

The drawings in this section describe the jaw and adapter systems.

The appropriate jaws, die adapters and dies required for a specific tubular OD are also described in this section of the manual.



STRAIGHT TOOTH



DIAMOND TOOTH

Note: Diamond Tooth Dies are used when a more aggressive bite is required.

Thickness	Width	OAL	P/N Straight Tooth	P/N Diamond Tooth
5/16	5/8	3 1/2	*	*
5/16	5/8	3 7/8	DTI4052	*
5/16	5/8	4 1/2	DTI4002	*
3/8	5/8	3 1/2	DTI4030	*
3/8	5/8	3 7/8	DTI4051	*
3/8	5/8	4 1/2	DTI4001	*

Thickness	Width	OAL	P/N Straight Tooth	P/N Diamond Tooth
17/32	5/8	3 1/2	DTI4031	*
17/32	5/8	3 7/8	DTI4053	*
17/32	5/8	4 1/2	DTI4003	*
5/8	5/8	3 1/2	DTI4032	*
5/8	5/8	3 7/8	DTI4054	*
5/8	5/8	4 1/2	DTI4004	*
11/16	5/8	3 7/8	DTI4055	*
11/16	5/8	4 1/2	DTI4005	*
3/8	1	3 7/8	DTI1505	*
3/8	1 1/4	3 7/8	DTI1614	*
3/8	1 1/4	5	DTI1610	*
7/16	1 1/4	3 7/8	DTI1612	DTI1612D
7/16	1 1/4	5	DTI1617	DTI1617D
1/2	1 1/4	3 7/8	DTI1601	DTI1601D
1/2	1 1/4	5	DTI1602	DTI1602D
9/16	1 1/4	3 7/8	DTI1622	DTI1622D
9/16	1 1/4	5	DTI1623	DTI1623D
5/8	1 1/4	3 7/8	DTI1632	DTI1632D
5/8	1 1/4	5	DTI1633	*
11/16	1 1/4	3 7/8	DTI1642	*
11/16	1 1/4	5	DTI1646	*
3/4	1 1/4	3 7/8	DTI1651	*
3/4	1 1/4	5	DTI1693	*
3/4	1 1/4	5 7/8	DTI1662	DTI1662D
13/16	1 1/4	3 7/8	DTI1661	*
13/16	1 1/4	5	DTI1664	*
7/8	1 1/4	3 7/8	DTI1671	*
7/8	1 1/4	5	DTI1673	*
1	1 1/4	3 7/8	DTI1691	*
1	1 1/4	5	DTI1697	*

* Available upon request.

CLINCHER® WRAP AROUND DIES

CLINCHER® Wrap Around Dies are available in three types:

Fine Toothed Steel Dies: for low to ultra high torque applications on carbon steel tubulars including tubing, casing, and drill pipe

Smooth Faced Aluminum Dies: for low to moderate torque applications on fiberglass and corrosion resistant alloy (stainless steel) tubulars

GRIT FACE™ Dies: for low to high torque applications on fiberglass and corrosion resistant alloy (stainless steel) tubulars where the use of steel dies is prohibited as well as on carbon steel tubulars where reduced marking is desired

CLINCHER® Dies are designed to match the OD of the tubing, casing, coupling, or accessory being made up or broken out. Each die is stamped on the top or side to identify its size. Using Fine Toothed Steel Dies which are slightly larger than the tubular is acceptable provided the difference in diameters is less than 3/32" (0.093"). Aluminum and **GRIT FACE™** Dies should be matched with the specific tubular diameters required. **Note:** The use of improperly sized dies can result in reduced torque capacity, increased pipe marking, and reduced die life.

CAUTION: Do not attempt to grip tubular diameters which are larger than the dies being used. Failure to observe this precaution can result in damage to the tubular or tong jaws.

In emergencies where correct die sizes are unavailable, some operators have successfully used two different sizes of dies to accommodate unusual, nonstandard diameters.

CLINCHER® Wrap Around Dies are manufactured in specific diameters to match standard tubing and casing diameters, API coupling diameters, selected work string connection diameters and certain commonly used premium connection coupling diameters. **CLINCHER®** Wrap Around Dies should not be used on tubulars which are larger than the nominal die size. Steel Toothed Dies can be used on tubulars which are no smaller than 3/32" (0.093") less than the nominal die size. Aluminum and **GRIT FACE™** Dies should be matched with the specific tubular diameters required.

Note: Fine Toothed Steel Dies are normally stocked in our Broussard, Louisiana facility. A listing of commonly manufactured sizes is shown on the following pages. Aluminum and **GRIT FACE™** Dies are normally made to order although a limited range of sizes and small quantities may be available from stock. Contact SUPERIOR Manufacturing & Hydraulics for information concerning availability of stock and special die sizes.

JAWS & ADAPTERS WITH DOVETAIL DIES

Ref Line No	Qty Reqd	Unit	Tubular Product &Tong or Backup Components	Description	CLINCHER® Strip Die Jaw or Adapter Part Number (Note 2)	CLINCHER® DOVETAIL or Wraparound Die Part Number	standard dovetail die thickness required	dovetail die overall length required		nominal jaw & adapter sizes	dovetail die part number for 3 7/8" overall length>	DTI1661	DTI1651	DTI1642	DTI1632	DTI1622	DTI1601	DTI1612
											dovetail die part number for 5" overall length>	DTI1664	DTI1693	DTI1646	DTI1633	DTI1623	DTI1602	DTI1617
											dovetail die thickness>	13/16	3/4	11/16	5/8	9/16	**1/2**	7/16
										Inserts required for standard tubular diameters shown in bold font. REPLACEMENT DOVETAIL INSERTS for TONG JAWS are 1 1/4" wide x 5" long (4 pcs required per tong jaw set). REPLACEMENT DOVETAIL INSERTS for BACKUP DOVETAIL DIE ADAPTERS are 1 1/4" wide x 3 7/8" long (6 pcs required per backup DT die adapter								
			20" casing															
1a	1	set of 2 pcs	tong jaw	20" tong jaw set w/ 1/2" dovetail strip dies	CJDT20H20000	DTI 1602	1/2	5		20.000	dovetail gripping size>	19.375	19.500	19.625	19.750	19.875	**20.000**	20.125
1b	3	each	backup die f/ tubular	21 x 20 splined adapter w/ 1/2" dovetail strip dies	BUDTX21-20000A	DTI 1601	1/2	3 7/8		20.000	dovetail gripping size>	19.375	19.500	19.625	19.750	19.875	**20.000**	20.125
1c	3	sets of 2 pcs	backup die f/ 21" OD coupling	buc2100021000 (f/ 20" cplg)		BUC2100021000	na	na		21.000	wrap around die size>	NA	NA	NA	NA	NA	**21.000**	NA
			18 5/8" casing															
2a	1	set of 2 pcs	tong jaw	18 5/8" tong jaw set w/ 1/2" dovetail strip dies	CJDT20H18625	DTI 1602	1/2	5		18.625	dovetail gripping size>	18.000	18.125	18.250	18.375	18.500	**18.625**	18.750
2b	3	each	backup die f/ tubular	21 x 18 5/8 splined adapter w/ 1/2" dovetail strip dies	BUDTX21-18625A	DTI 1601	1/2	3 7/8		18.625	dovetail gripping size>	18.000	18.125	18.250	18.375	18.500	**18.625**	18.750
2c	3	each	backup die f/ 19 5/8" OD coupling	21 x 20 splined adapter w/ 11/16" dovetail strip dies (f/18 5/8" cplg)	BUDTX21-19625A	DTI 1601	1/2	3 7/8		19.625	dovetail gripping size>	19.000	19.125	19.250	19.375	19.500	**19.625**	19.750
			16" casing															
3a	1	set of 2 pcs	tong jaw	16" tong jaw set w/ 1/2" dovetail strip dies	CJDT20H16000	DTI 1602	1/2	5		16.000	dovetail gripping size>	15.375	15.500	15.625	15.750	15.875	**16.000**	16.125
3b	3	each	backup die f/ tubular	21 x 16 splined adapter w/ 1/2" dovetail strip dies	BUDT21-16000A	DTI 1601	1/2	3 7/8		16.000	dovetail gripping size>	15.375	15.500	15.625	15.750	15.875	**16.000**	16.125
3c	3	each	backup die f/ 17 " OD coupling	21 x 17 splined adapter w/ 1/2" dovetail strip dies (f/16" cplg)	BUDT21-17000A	DTI 1601	1/2	3 7/8		17.000	dovetail gripping size>	16.375	16.500	16.625	16.750	16.875	**17.000**	17.125
			14" casing															
4a	1	set of 2 pcs	tong jaw	14" tong jaw set w/ 1/2" dovetail strip dies	CJDT20H14000	DTI 1602	1/2	5		14.000	dovetail gripping size>	13.375	13.500	13.625	13.750	13.875	**14.000**	14.125
4b	3	each	backup die f/ tubular	21 x 14 splined adapter w/ 1/2" dovetail strip dies	BUDT21-14000A	DTI 1601	1/2	3 7/8		14.000	dovetail gripping size>	13.375	13.500	13.625	13.750	13.875	**14.000**	14.125
4c	3	each	backup die f/ 14 1/2" OD coupling (note 1)	21 x 14 1/2 splined adapter w/ 1/2" dovetail strip dies (note 1)	BUDT21-14500A	DTI 1601	1/2	3 7/8		14.500	dovetail gripping size (see note 1)>	13.875	14.000	14.125	14.250	14.375	**14.500**	14.625
			11 7/8" casing															
5a	1	set of 2 pcs	tong jaw	11 7/8" tong jaw set w/ 1/2" dovetail strip dies	CJDT20H11875	DTI 1602	1/2	5		11.875	dovetail gripping size>	11.250	11.375	11.500	11.625	11.750	**11.875**	12.000
5b	3	each	backup die f/ tubular	21 x 11 7/8 splined adapter w/ 1/2" dovetail strip dies (f 10 7/8" cplg & 11 7/8" csg)	BUDT21-11875A	DTI 1601	1/2	3 7/8		11.875	dovetail gripping size>	11.250	11.375	11.500	11.625	11.750	**11.875**	12.000
5c	3	each	backup die f/ 12 7/8" OD coupling	21 x 12 7/8 splined adapter w/ 1/2" dovetail strip dies (f/ 11 7/8 cplg)	BUDT21-12875A	DTI 1601	1/2	3 7/8		12.875	dovetail gripping size>	12.250	12.375	12.500	12.625	12.750	**12.875**	13.000
			10 3/4" casing															
6a	1	set of 2 pcs	tong jaw	10 3/4" tong jaw set w/ 1/2" dovetail strip dies	CJDT20H10750	DTI 1602	1/2	5		10.750	dovetail gripping size>	10.125	10.250	10.375	10.500	10.625	**10.750**	10.875
6b	3	each	backup die f/ tubular	21 x 10 3/4 splined adapter w/ 1/2" dovetail strip dies (f/ 10 3/4" csg)	BUDT21-10750A	DTI 1601	1/2	3 7/8		10.750	dovetail gripping size>	10.125	10.250	10.375	10.500	10.625	**10.750**	10.875
6c	3	each	backup die f/ 11 3/4" OD coupling	21 x 11 3/4 splined adapter w/ 1/2" dovetail strip dies (f 10 3/4" cplg & 11 3/4" csg)	BUDT21-11750A	DTI 1601	1/2	3 7/8		11.750	dovetail gripping size>	11.125	11.250	11.375	11.500	11.625	**11.750**	11.875
			9 7/8" casing															
7a	1	set of 2 pcs	tong jaw	9 7/8" tong jaw set w/ 1/2" dovetail strip dies	CJDT20H09875	DTI 1602	1/2	5		9.875	dovetail gripping size>	9.250	9.375	9.500	9.625	9.750	**9.875**	10.000
7b	3	each	backup die f/ tubular	21 x 9 7/8 splined adapter w/ 1/2" dovetail strip dies (f/ 9 7/8" csg & 8 7/8" cplg)	BUDT21-09875A	DTI 1601	1/2	3 7/8		9.875	dovetail gripping size>	9.250	9.375	9.500	9.625	9.750	**9.875**	10.000
7c	3	each	backup die f/ 10 7/8" OD coupling	21 x 10 7/8 splined adapter w/ 1/2" dovetail strip dies (f/ 9 7/8" cplg)	BUDT21-10875A	DTI 1601	1/2	3 7/8		10.875	dovetail gripping size>	10.250	10.375	10.500	10.625	10.750	**10.875**	11.000
			7 5/8" casing															
8a	1	set of 2 pcs	tong jaw	7 5/8" tong jaw set w/ 1/2" dovetail strip dies	CJDT20H07625	DTI 1602	1/2	5		7.625	dovetail gripping size>	7.000	7.125	7.250	7.375	7.500	**7.625**	7.750
8b	3	each	backup die f/ tubular	21 x 7 5/8 splined adapter w/ 1/2" dovetail strip dies (f/ 7 5/8" csg & 8 5/8" cplg)	BUDT21-07625A	DTI 1601	1/2	3 7/8		7.625	dovetail gripping size>	7.000	7.125	7.250	7.375	7.500	**7.625**	7.750
8c	3	each	backup die f/ 8 5/8" OD coupling	21 x 8 5/8 splined adapter w/ 1/2" dovetail strip dies (f/ 8 5/8" csg & 7 5/8" cplg)	BUDT21-08625A	DTI 1601	1/2	3 7/8		8.625	dovetail gripping size>	8.000	8.125	8.250	8.375	8.500	**8.625**	8.750

(Note 1) Jaws, jaw adapters and dies are not normally required for this upset integral joint connection.

(Note 2) Part number shown for jaws and adapters using strip dies is for basic part without dovetail strip dies. Dies must be ordered separately.

JAWS WITH DOVETAIL DIES FOR CLE20000XHT-01

Ref Line No	Qty Reqd	Unit	Tubular Product &Tong or Backup Components	Description	Combo DOVETAIL Jaw Part Number (Note 2)	CLINCHER® DOVETAIL or Wraparound Die Part Number	standard dovetail die thickness required	dovetail die overall length required		nominal jaw & adapter sizes	dovetail die part number for 3 7/8" overall length>	DTI1661	DTI1651	DTI1642	DTI1632	DTI1622	DTI1601	DTI1612
											dovetail die part number for 5" overall length>	DTI1664	DTI1693	DTI1646	DTI1633	DTI1623	DTI1602	DTI1617
											dovetail die thickness>	13/16	3/4	11/16	5/8	9/16	**1/2**	7/16
										Inserts required for standard tubular diameters shown in bold font. REPLACEMENT DOVETAIL INSERTS for TONG JAWS are 1 1/4" wide x 5" long (4 pcs required per tong jaw set). REPLACEMENT DOVETAIL INSERTS for BACKUP DOVETAIL DIE ADAPTERS are 1 1/4" wide x 3 7/8" long (6 pcs required per backup dovetail die adapter set.)								
			8 5/8" casing															
1	1	set of 2 pcs	tong jaw	8 5/8" tong jaw set w/ 1/2" dovetail strip dies	20117-08625A	DTI 1602	1/2	5		8.625	dovetail gripping size>	8.000	8.125	8.250	8.375	8.500	**8.625**	8.750
			8 1/2" tool joints															
2	1	set of 2 pcs	tong jaw	8 1/2" tong jaw set w/ 1/2" dovetail strip dies	20117-08500A	DTI 1602	1/2	5		8.000	dovetail gripping size>	7.375	7.500	7.625	7.750	7.875	**8.000**	8.125
			7 5/8" casing															
3	1	set of 2 pcs	tong jaw	7 5/8" tong jaw set w/ 1/2" dovetail strip dies	20117-07625A	DTI 1602	1/2	5		7.625	dovetail gripping size>	7.000	7.125	7.250	7.375	7.500	**7.625**	7.750
			7" casing															
4	1	set of 2 pcs	tong jaw	7" tong jaw set w/ 1/2" dovetail strip dies	20117-07000A	DTI 1602	1/2	5		7.000	dovetail gripping size>	6.375	6.500	6.625	6.750	6.875	**7.000**	7.125
			6 5/8" casing															
5	1	set of 2 pcs	tong jaw	6 5/8" tong jaw set w/ 1/2" dovetail strip dies	20117-06625A	DTI 1602	1/2	5		6.625	dovetail gripping size>	6.000	6.125	6.250	6.375	6.500	**6.625**	6.750
			5 1/2" casing															
6	1	set of 2 pcs	tong jaw	5 1/2" tong jaw set w/ 1/2" dovetail strip dies	20117-XXXXXA	DTI 1602	1/2	5		5.500	dovetail gripping size>	4.875	5.000	5.125	5.250	5.375	**5.500**	5.625
					See Note 1													
			5" casing															
7	1	set of 2 pcs	tong jaw	5" tong jaw set w/ 1/2" dovetail strip dies	20117-05000A	DTI 1602	1/2	5		5.000	dovetail gripping size>	4.375	4.500	4.625	4.750	4.875	**5.000**	5.125
			Note 1: XXXXX indicates this size has not been designed at this time, but is available upon request.															
			Note 2: Part number shown for jaws and adapters using strip dies is for basic part without dovetail strip dies. Dies must be ordered separately.															

ASSEMBLY TORQUE REQUIREMENTS

FASTENER LUBRICATION AND MAKE UP TORQUE REQUIREMENTS

Most bolts, nuts, and other threaded components are to be lubricated with Never-Seez or equivalent before assembly. Certain fasteners are to be assembled using permanent or removable Loctite as indicated in the assembly instructions. All tapered pipe threads are to be treated with a Teflon based pipe dope to assist in makeup and prevent leakage.

CAUTION: Do not use teflon tape. Improper application of teflon tape can cause joint failures. Teflon tape can release large particles which can plug small passages in hydraulic equipment.

All standard fasteners used in **CLINCHER®** products are to be GRADE 8 or better. DO NOT SUBSTITUTE lessor grades of fasteners. All fasteners are to be made up to the torque charted below. Failure to properly assemble these fasteners can result in their loss, product malfunction, and ultimately result in situations where personnel can be exposed to dangerous situations.

LUBRICATION STANDARDS

Bearings and gears must be lubricated to minimize friction, cool, exclude foreign matter, and prevent corrosion. **CLINCHER®** recommends using Texaco Marfak MP 2 or equivalent for all grease zerts, roller bearings and bushings. Gears located within the clutch housing or between the tong plates are to be heavily lubricated using PLUSCO 855 or equivalent.

TONG and BACKUP FASTENERS		
Size	***Application***	***Torque***
1/4 - 20 NC	door switch mounting bolts	10 ft lbs
3/8 - 16 Set Screws	bearing caps, door switch adj. sleeve	* [1]
3/8 - 16 NC	locking pin retainer bolt, low gear housing cover, ring gear key, door latch pivot pin bolt, clip bolts, jaw bolts	33 ft lbs
1/2 - 13 NC	brake bands, motor mounts, upper bearing caps, door bolt, backup clip bolts	93 ft lbs
5/8 - 11 NC	top and bottom tong plates, lower bearing caps, combo jaw bolt, hanger bolts	180 ft lbs
3/4 - 10 NC	cage plate spacer bolts, jaw adapter bolts, backup bolts, bail bolts	317 ft lbs
7/8 - 14 NF	cam follower	512 ft lbs
1 - 8	locking pin bolt, backup door bolts, bail bolts, leg bolts	100 ft lbs
1 - 12 NF	dumbell roller, tong door jam nut	* [2]
1 1/2 - 12 NF	idler shaft	1,200 ft lbs

* 1 Bearing Caps: Coat with removable Loctite, tighten until screw contacts bearing, back off 1 turn.
* [2] Tighten until all slack is removed, but dumbell roller is still free to rotate by hand.

OPERATION

Suspension

A) Tong should be hung by minimum 1" IWRC minimum O.D. wire cable with a 51.7 ton minimum breaking strength. It should be hung as close to the center of the drill rotary without interfering with operation of drill string and lifting equipment. It is recommended the operator make use of the **CLINCHER®** Lift Cylinder. The **CLINCHER®** Lift Cylinder incorporates a hydraulic cylinder and manual lift spring. The hydraulic cylinder portion is used to assist in the raising and lowering of the tong and backup while the spring allows for movement during make-up and break-out.

WARNING: The suspension system must allow the tong to easily move down a distance equivalent to the thread make-up length. If significant resistance is encountered the suspension system may be subject to load which could cause its failure, damage equipment, or expose personnel to severe or fatal hazards.

B) Assure that the tong is suspended in level manner. Both tong and backup must be level at the point they contact the tubular. Using adjustment screws and slots in rigid hanger assembly, adjust tong so that it hangs level on horizontal axis and is parallel to tubular on vertical axis.

C) Make certain that floor space is adequate to maneuver tong on and off pipe. The space must be clear of obstructions to allow safe and unrestricted operation.

D) Attach 1 1/2" IWRC minimum wire cable with a 114 ton minimum breaking strength as a tong back up line at 90 degree angle to tong and at the same level to insure proper readout of torque indicator. You should always have snubbing line attached. Use of a integral hydraulic backup is safer than manual backup, but operators should maintain additional safety of snubbing line to prevent injury in case of hydraulic failure or the failure of operator to have backup properly applied to tubular. This equipment generates extreme torque and should be used with caution.

Jaw and Wrap Around Die Installation

A) Be sure all power to unit is off, and power unit is shut down. Disconnect hydraulic hoses.

B) Determine O.D. of tubular to be made-up or broken-out. Use proper dies to bite O.D. of tubular and insert as follows: Remove jaw assembly from tong. Remove upper die retainer clips. Insert die into jaw. Reinstall clips and clip retainer bolts. Reinstall jaws into cage plates, install pivot pins and reattach springs.

Hydraulic Lines

A) Be sure all power to unit is off, and power unit is shut down.

B) Always inspect hoses prior to installation for abrasions, kinks, and other visible damage.

C) Install hydraulic supply hose and hydraulic return hose between tong and hydraulic power unit. Be advised that the standard installation on **CLINCHER®** Tong calls for 1" Hydraulic Supply hose and 1-1/4" Hydraulic Return hose. The differing hoses will eliminate the possibility of attaching the wrong hose to the wrong outlet while at the same time reducing back pressure in your hydraulic system.

Tong Operation

A. Insure proper dies are installed. Connect hydraulic hoses, verify reservoir is full of hydraulic fluid and insure suction valve is open.

B. Open bypass valve to hydraulic system, then check to make sure all hose connections are secure and hydraulic system is free of leaks.

C. Be certain door is completely closed before operation to insure safe operation. The **CLINCHER®** Tong is equipped with a door switch, which prevents operation of the tong when door is even partially open.

D. Use power unit to start up procedure as outlined in your owners manual supplied by the manufacturer.

E. In the event hoses are not tightened securely, possible failures to hydraulic system can occur.

1) If pressure supply hoses are restricted or flow is blocked, pressure will increase in the hydraulic power unit, resulting in increased RPM in the power unit.

2) If return line hoses are restricted or flow is blocked, pressure will increase in the hydraulic power unit and the hydraulic system to the tong itself, resulting in the tong motor increasing to maximum pressure and possible motor seal failure.

F. After completion of A through E restart the power unit and allow engine to idle for approximately 10 minutes. Slowly close bypass valve to allow circulation of hydraulic oil through tong and hoses. Place shifting lever into low and rotate several times. Repeat in reverse. If correct jaw-die combination is installed, the unit is now ready to run pipe.

G. Adjust height of tong and backup to proper height, using the control valve located all the way to the right of rear valve bank assembly.

OPERATION

H. Stand in the normal operators position, insert the locking pin into the rear cage plate hole (on operators side). This pin allows ring gear to rotate clockwise (make-up) and engage the can to close jaws on pipe.

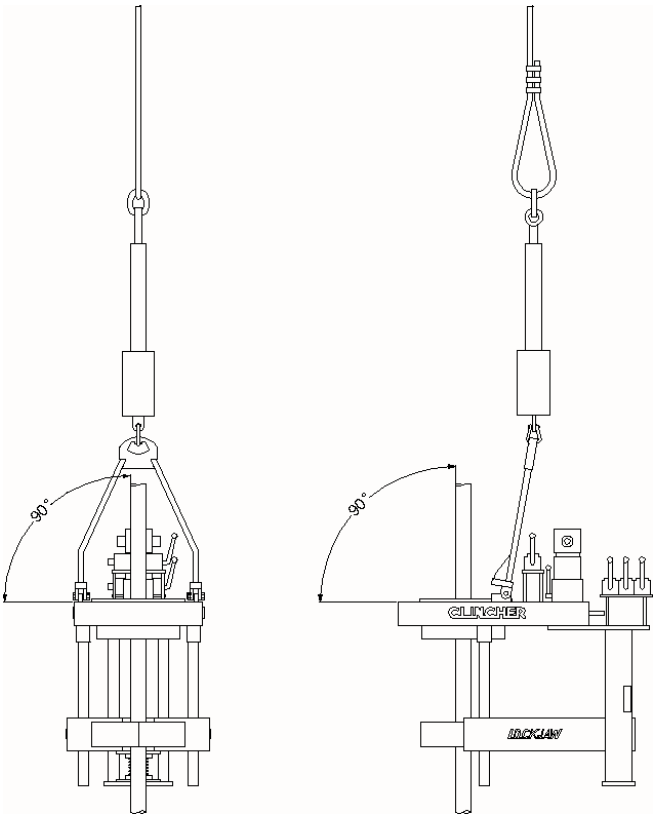
I. Swing tong and backup onto tubing, making sure to align tubing on rear jaw of backup. Close backup jaws by pushing middle control lever forward. The design of the **CLINCHER® LOCKJAW™** Backup centers pipe in the backup and tong. Close tong door.

J. Rotate ring gear clockwise by pushing motor control lever on the front valve bank assembly forward until jaws lock on pipe and continue to rotate until desired amount or torque is applied.

K. After correct amount of torque specific to that connection has been applied, release tong jaws by pulling back on motor control lever until jaws release and throat in cage plate is aligned with door opening. Open door.

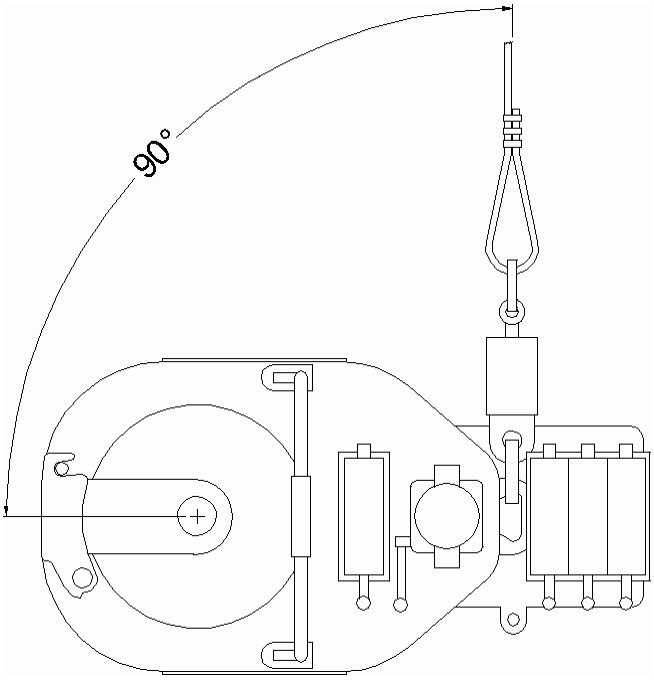
L. Release backup by pulling back on right control lever on rear valve bank assembly until backup jaws are completely retracted.

M. High and low gear is adjusted by use of shifting handle PN 45142, located to the left side of the shifting housing. With the lever in the upwards position the tong is in high gear. With the shifting lever in the downward position, the tong is in low gear.



TYPICAL TONG INSTALLATION

NOTE: TONG IS PERPENDICULAR TO TUBING



TYPICAL SNUB LINE INSTALLATION

NOTE: SNUB LINE IS PERPENDICULAR TO AXIS OF TONG

MAINTENANCE

CLINCHER® recommends that owners of **CLINCHER®** Hydraulic Power Tongs, Backups, **CHROMEMASTER™**s, and accessories adapt a regularly scheduled maintenance program. Implementation of this type of program offers several benefits. First you increase the life of your equipment, secondly, you may find a problem before it escalates to a costly repair or down time on the job, and most important, prevent injury to operating personnel.

A major inspection (described at the end of this section) should be carried out if equipment is suspected to have been damaged during transit or is to be mobilized to a remote location where maintenance operations are difficult to carry out.

Routine Maintenance

Cleaning - Upon return from each and every job:

A) Pre-wash unit to remove majority of dirt and grease build up as to allow removal of dies, and inspection of overall condition of unit.

B) Remove and inspect dies from tong and backup. Note any missing or damaged die retainers, and/or die retainer bolts.

C) Remove side jaws from tong and inspect side jaw for missing or broken parts, damaged splines, broken ears (locking hooks on front portion of side jaws).

D) Clean and inspect side jaws, jaw pins, jaw rollers for damage or excessive wear. Lubricate pins and rollers, and reinstall in tong.

E) Remove, clean (in non-flammable solvent), and inspect back jaws in tong.

F) Check jaw pins for breakage, cracks, and uneven wear patterns. Inspect jaw rollers for cracks, breakage, and flat spots.

G) Reassemble jaw sections replacing any damaged parts. Lubricate jaw pins and rollers using gear grease. Set aside for testing.

H) Clean and inspect backup operating cylinder. Insure spline area is free from damage and any rust or dirt is removed. Replace any missing or damaged die retainer clips and die retainer bolts.

I) Inspect hanger and all hoses for wear, replace as necessary.

J) Inspect hanger assembly to assure all parts are returned and in operating condition.
(*i.e.* H-Plates, spring, leg springs, leg spring caps and pins)

K) Replace jaw pins and rollers in tong.

L) Lubricate tong's cam followers (upper and lower), dumbell roller shafts (upper and lower zerts), door shaft, center idler gear shaft, outboard idler gear shafts, pinion gear and secondary gear assemblies (Pinion gear and secondary gear assemblies are installed with sealed bearings. There are no provisions to grease these bearings. However, if replaced by non-sealed bearings, the 1/8" NPT flush plugs should be replaced with zerts PN 1001 and both gear assemblies should be added to the regular lubrication schedule.), low gear housing, and shift housing, and re-pack tong body cavity. Lubricate zerts in backup plates and pins.

M) Install dies of a size needed for testing purposes, and attach hydraulic power unit to tong. Before energizing power unit make certain no one is working on tong or backup and all tools and parts are removed from the tong and backup.

N) Insert test mandrel of the exact same size as the dies which are installed in the tong and backup.

Caution: Testing the function of the backup without the proper size dies installed and/or without the proper size mandrel in place, you risk serious damage to the backup cylinder.

O) After power unit has reached operating RPM and temperature, operate the backup control valve and close backup around test mandrel using sufficient flow and pressure to clamp mandrel and maintain pressure to backup. (Recommended operating pressure of 2,500 psi.) Backup pressure gauge should match system operating pressure. After release of control valve you may experience a slight drop in backup pressure (up to 300 psi), this is normal. If backup pressure drops more than 300 psi within 2 minutes, you may be experiencing a hydraulic leak.

P) While maintaining pressure on backup visually inspect hoses, stainless steel lines, fittings, etc., for seepage of hydraulic fluid. Repair or replace parts causing leaks. If you see no visible external leaks and your backup is still losing pressure, there may be an internal leak in the operating cylinder or load holding valve allowing fluid to bypass the piston. It is recommended that the backup be returned to the manufacturer for repair.

Q) If at this time your backup is functioning correctly, open and close unit several times to insure consistent operation.

R) With the proper dies installed in the tong and backup, and test mandrel locked in the backup, place reversing pin into the make-up position, set tong into low gear and operate tong through several cycles of locking, biting, and torqueing to required torque. Change reversing pin to break-out position and repeat. Repeat same procedure in high gear.

Note: Torque developed in high gear is considerably less than torque developed in low gear.

MAINTENANCE

S) Test door interlock system by opening door slightly with tong rotating. (Remove test mandrel for this procedure.) The tongs rotation should stop. If tong rotation fails to stop, close door, cease rotation, deactivate power unit, and inspect door interlock switch for damage. Insure that adjustment collar is oriented to allow wheel of door switch to fit into recess on collar.

Warning: If door switch system is not functioning properly tong must not be used.

T) Reinspect tong and backup hydraulic system for leaks.

U) If at this time the unit is functioning as intended, replace all covers and grease splines in tong and backup (side jaws and back jaws), tape or grease spools on control valves (to prevent paint from adhering to polished spool surface), prime and paint unit for storage.

Recommended Lubrication Schedule Performed after Completion of Each Job

Hydraulic Tong

A) Cam followers: upper and lower (all)
B) Dumbell roller shafts: upper and lower (all)
C) Door shaft
D) Center idler shaft
E) Outboard idler shafts
F) Low gear housing
G) Shift housing
H) Re-pack tong cavity
I) Pinion and secondary gear shafts (if sealed bearings have been replaced by non-sealed bearings)
J) Jaw rollers and pins. Remove jaw pins and rollers, clean and lubricate with gear grease.
K) Inspect hydraulic fluid for foreign material and contaminants. Filter or replace. You must filter or replace entire system including power unit tank and lines along with tong and backup to insure all contaminants are removed.

Annual Major Maintenance

Inspection and Repair

Routine preventative maintenance will significantly extend the operating life of your equipment, reduce operating cost and avoid downtime. **CLINCHER®** recommends a program of frequent routine inspection, and if equipment is suspected to have been damaged during transit or is to be mobilized to a remote location where maintenance operations are difficult to carry out, perform the following:

A) Visually inspect components on power tong or backup which could possibly have been damaged either during operation or transit. *i.e.* Damage to hanger assembly, hydraulic backup, mounting legs, or hydraulic valve assembly.

B) Check test date. Ensure that a load test and inspection was carried out within the last 9 months.

C) Check ring gear. Check for any signs of damage or wear.

D) Remove motor and valve assembly from tong body.

E) Check motor seal. Apply hydraulic power, run motor and visually check motor seal for any signs of leakage.

F) Check drive gear, high and low pinion gears. Check for excessive sign of wear on motor gear.

G) Check condition of control valve spools. Activate valves and check for any sign of wear, pitting, or scoring of the chrome surface of spools. If spool is damaged in any way, the complete section must be changed out. Spools are not interchangeable.

H) Check gear selector and shaft. Visually inspect shifting shaft for alignment and straightness.

I) Check Hi/Low Gear assembly. Visually inspect high and low clutch and gears for any sign of chipped, broken, or worn teeth.

J) Check dumbell rollers, shafts, and bushings. Check for excess movement on either bearings, bushings, shafts, or dumbells.

K) Check idler gears and center pinion shaft gears and bearings. Check that there are no signs of worn, chipped, or broken teeth on idler and center pinion shaft gears.

L) Check door bearings. Visually check excess movement on bearings at door assembly. If excess movement is found door must be removed making careful note of bearing washer positions for reassembly.

M) Check door switch system. Visually check that door switch valve has sufficient strength to hold door in closed position. If this is not the case, then repairs are required.

N) Check door safety device. Functionally check tong door safety switch. Engage low gear, open tong door and push rotor control lever forward as if to rotate rotor. If safety device is operational then the rotor will not rotate.

O) Check lifting hanger test date. Check lifting hanger for damage. Ensure that a load test and inspection was carried out within the last 9 months.

P) Check condition of all hydraulic hoses and fittings. Visually inspect all hydraulic hoses fitted to the tong and in the backup for any signs of leaks, cuts, or wear.

MAINTENANCE

Q) Reinstall all parts which were removed for inspection and/or damage. Connect to hydraulic power supply and function test operation of tong in high, low, forward, and reverse. Torque test utilizing appropriate dies and test mandrel. Test operation of lift cylinder.

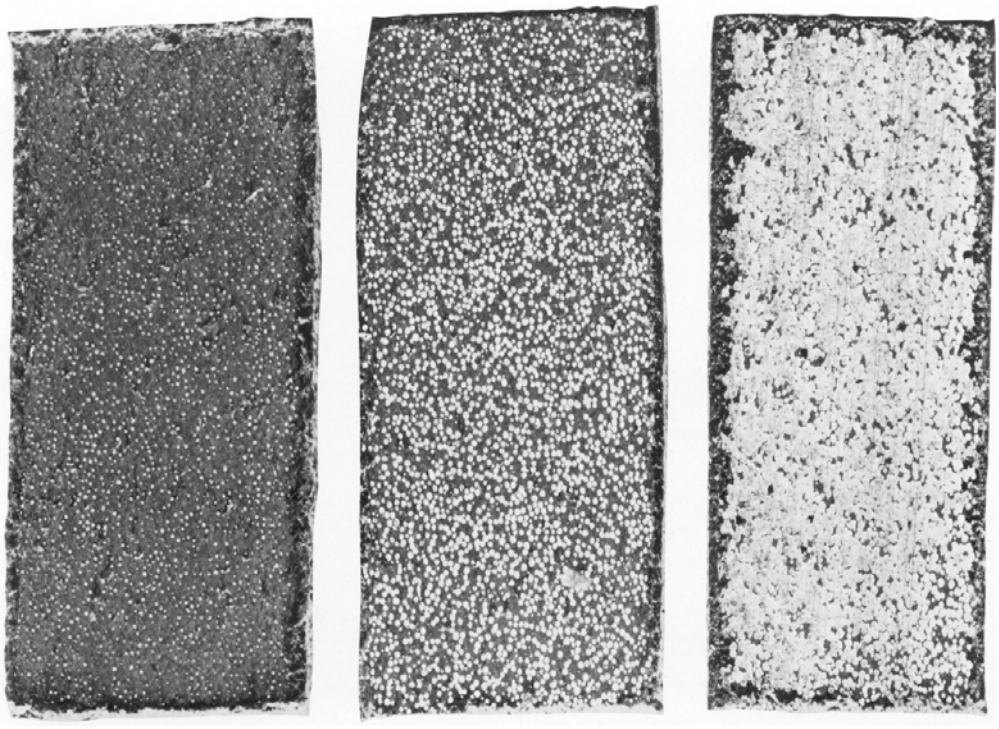
R) Inspect power unit system according to manufactures specifications.

S) Lubricate tong and backup according to maintenance schedule preceding this section.

T) Paint, remembering to mask off surfaces not intending to paint with grease or masking tape.

U) Complete dated inspection report giving details of all duties performed along with complete list of items replaced.

DU® BEARING DRY WEAR PROCESS



1. 2.

3.

1. Running-in completed. Low wear rate starts when up to 10% of the bronze is exposed.
2. Typical surface appearance when DU® bearing approaches its half life with 40% to 50% of the bronze exposed.
3. Bronze is beginning to smear near the end of DU's useful life as a dry bearing. Over 75% of the bronze is visible at the surface.

For additional information about DU bearings, please contact Garlock Bearings Inc,
700 Mid Atlantic Parkway, Thorofare, New Jersey 08086. **(609) 848-3200** FAX: (609) 848-5115

Coltec Industries

Garlock Bearings Inc

TROUBLESHOOTING

HYDRAULIC SYSTEM

Hydraulic Pump Making Excessive Noise:

	Problem	Solution
A)	Restricted or clogged intake line	Clean line, check for contamination.
B)	Contaminated fluid	Flush system, change fluid.
C)	Restricted vent	Clean or replace air vent.
D)	Air in fluid	Check for leaks and be certain fluid suction in tank is well below hydraulic fluid in reservoir.
E)	Damaged or worn parts	Repair or replace damaged parts, check fluid for contamination.
F)	Excessive RPM	Check PTO, gears, and recommended speed to assure proper pump is installed for operation.
G)	Increased friction	Make sure pump has been assembled using correct torque values.
H)	Damaged or worn relief valve.	Replace relief valve.
I)	Damaged or worn check valve.	Replace check valve.
J)	Restricted discharge	Check to make sure relief valve is set to proper pressure.
K)	Valve system restricted	Inspect and repair or replace defective parts, check system for contamination.

Excessive Wear to Hydraulic Components:

	Problem	Solution
A)	Fluid contamination	Flush fluid system, replace with new fluid.
B)	Components misaligned	Inspect and realign.
C)	High operating pressures	Gauge and set to proper pressure.
D)	Exhausted fluid (depletion of additives)	Flush fluid system, replace with new fluid.
E)	Air in fluid	Check for leaks, and be certain fluid suction in tank is well below hydraulic fluid in reservoir.
F)	Shortened bearing life	Check alignment, insure proper lubrication to non-sealed bearings.

TROUBLESHOOTING

HYDRAULIC TONG SECTION

Slow Tong Speed:

	Problem	Solution
A)	Restricted supply line	Clear supply line and check intake on reservoir.
B)	Low fluid level	Add fluid to proper volume.
C)	Air leak	Locate and repair leak.
D)	Pump speed insufficient	Assure proper pump speed for application.
E)	Damaged or worn equipment	Isolate pump and check pressure to determine whether motor or pump is defective. Repair or replace defective part.
F)	Pump not primed	Check fluid viscosity and restrictions of intake line. Replace fluid if inadequate for operating temperature.
G)	Low or no flow from supply line	Check to assure couplings are securely fastened.
H)	Hydraulic bypass valve malfunction	Inspect. Adjust unloading pressure. Replace or repair as necessary.

Insufficient Torque:

	Problem	Solution
A)	Door switch malfunctioning	Check to make sure door is completely closed. Inspect door switch and dump valve. Replace or repair door switch and/or dump valve.
B)	Relief valve malfunctioning	Relief set too low, broken valve spring, contamination or defective seals.
C)	Damaged or worn pump parts	Inspect, repair, or replace.
D)	Slow pump speed	Assure proper pump speed for application.
E)	Improper system fluid	Check fluid viscosity and replace fluid if inadequate for operating temperature.
F)	Directional control valve set improperly	Check relief and directional control valve. Neutral should return slightly to reservoir.

Hydraulic Tong System:

	Problem	Solution
A)	Damage to motor	Inspect, repair, or replace.
B)	Restriction of supply line, excessive back pressure	Check to assure couplings are securely fastened.
C)	Defective gauge or load cell	Inspect, repair, or replace. Assure unit has been calibrated to proper arm length. NOTE: When using **CLINCHER®** integral backup system, it is the length of backup arm, NOT the tong arm length.

TROUBLESHOOTING

HYDRAULIC TONG SECTION

Difficulty Shifting Gears:

	Problem	Solution
A)	Broken key in shifting yoke	Inspect and replace key stock in shifting yoke.
B)	Worn or damaged shifting yoke pins	Inspect and replace broken or worn pins.
C)	Insufficient lubrication	Pump grease into both zerts located on shift housing.
D)	Spring Plunger set too tight	Inspect and relieve pressure by adjusting set screw/spring plunger on shifting gear PN 55084-02.

Failure to Grip Tubulars:

	Problem	Solution
A)	Jaws move out from neutral, but fail to penetrate pipe. Tong not perpendicular.	Inspect die size and replace with correct dies for pipe. Wrong size dies for tubulars. Assure suspension of tong is perpendicular to tubulars. Adjust hanger as necessary.
B)	Jaws fail to move out of neutral. Brake band not tight enough, faulty cam followers, rust debris or damage to jaws.	Inspect for excessive wear on brake band. Inspect and replace defective cam followers. Remove rust and debris from jaws, and jaw pockets. Inspect jaw rollers and pins for wear, flats, and lubrication. Repair, replace, and lubricate as needed.
C)	Tong will not release from tubular. Brake band not tight enough, defective cam followers in cage plate, insufficient lubrication to jaw pin and roller.	Inspect for excessive wear on brake band. Inspect and replace defective cam followers. Remove rust and debris from jaws, and jaw pockets. Inspect jaw rollers and pins for wear, flats, and lubrication. Repair, replace, and lubricate as needed.
D)	Tong motor runs but ring gear does not rotate. Broken gears or defective shift in hydraulic tongs system.	Inspect and replace defective gears. Inspect and repair or replace defective shifting parts.
E)	Tong binds under light load. Worn or damaged cam followers, dumbell roller bearing, or idler bearing.	Inspect and replace defective parts.
F)	Ring gear rotates while control lever is in neutral.	Replace control valve.
G)	Shift will not stay in set position. Lost spring plunger.	Replace spring plunger.
H)	Hydraulic fluid leaking from motor. Damaged or worn motor shaft seal.	Replace motor shaft seal.

TROUBLESHOOTING

HYDRAULIC BACKUP SYSTEM

	Problem	Solution
A)	Incorrect die for size tubular	Check pipe OD and match die size to pipe OD.
B)	Dies have material compacted in tooth area; worn teeth.	Clean dies with wire brush and inspect. Replace with new dies if necessary.
C)	Power unit pressure set incorrectly	Inspect relief valve on power unit to make sure enough system pressure is being delivered to backup.
D)	Counter balance valve not holding pressure	Remove side plates on backup. Bench test and replace the defective counter balance valve.
E)	Internal leakage in backup cylinder	Disconnect lines and bench test cylinder. Repair or replace as necessary.
F)	Jaws will not retract. Counter balance valve is stuck.	Replace counter balance valve.
G)	External leakage of cylinder	Repair or replace cylinder.
H)	Control valve set to neutral, but jaws extend.	Inspect control valve for damage and/or incorrect spool. Repair or replace as necessary.

SECTION 7 RECOMMENDED SPARE PARTS LIST

RECOMMENDED SPARE PARTS LIST FOR REMOTE AREAS

Quantity	Part Number	Description
1	12501437	Seal for Rineer Motor
2	73013-01	Jaw Pins for Combo Jaw Pusher
2	73012-01	Jaw Rollers for Combo Jaw Pusher
2	73012-02	LF Jaw Rollers for Combo Jaw Pusher
2	20071	Jaw Pins for 7 5/8" – 20" DT
2	20070	Jaw Rollers for 7 5/8" – 20" DT
8	1001	1/8" NPT Zerts
1	SLV1000-01	Door Switch
1	45072	Shifting Yoke Weldment
1	20056	Brake Band Assembly
1	BUCS2110	Left Jaw Torsion Spring (Outside Door)
1	BUCS2111	Right Jaw Torsion Spring (Inside Door)
2	BUCS2112	Door Rollers
1	DVG35-HMRV	A-35 Relief Cartridge

SECTION 8 ACCESSORIES AND OPTIONS

Several different accessory items are available for the **CLINCHER®** Tong and Backup to allow them to be customized to provide a system most appropriate for the inducer's application.

CLE20000XHT-XX Tong Accessories

Compression Load Cell and Torque Gauge	directly measures applied torque
Tension Load Cell and Torque Gauge	directly measures applied torque
Solenoid Operated Module for Dump Valve	allows computer to limit torque applied
Adapter for Turns Proximity Switch	allows computer to sense rotation
Lift Cylinder with Integral Spring Hanger	controls vertical position
TSP-80 Tong Speed Control	allows slow speed rotation with full torque
2 Speed Motors	
Alternate Motor Displacements	

BUCS21000-XX Backup Accessories

Backup Handles	simplifies manipulation
Shipping Skids and Cages	simplify handling, transport and help guard against damage

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CAGE PLATE ASSEMBLY *(Assembly No. 20068-01)* ..... 9 - 17

SEVERE SERVICE CAM FOLLOWER ASSEMBLIES *(Assembly No. SSCF1875 & SSCFF2000)* ..... 9 - 18

TOP PLATE ASSEMBLY *(Assembly No. 20054)* ..... 9 - 19

BOTTOM PLATE ASSEMBLY *(Assembly No. 20053)* ..... 9 - 20

LATCHING DOOR ASSEMBLY *(Assembly No. 20106)* For tongs manufactured before 10/2009 ..... 9 - 21

LATCHING DOOR ASSEMBLY *(Assembly No. 20106)* For tongs manufactured after 10/2009 ..... 9 - 21.1

DOOR SWITCH ASSEMBLY *(Assembly No. 26681)* ..... 9 - 22

BRAKE BAND ASSEMBLY *(Weldment No. 20056) (2 Req'd)* ..... 9 - 23

BAIL ASSEMBLY *(Assembly No. 26728)* ..... 9 - 24.1

BRIDLE ASSEMBLY *(Assembly No. 20150)* ..... 9 - 24.2

20" COMBO JAW ADAPTOR ASSEMBLY *(Assy. No. 20111)* ..... 9 - 25

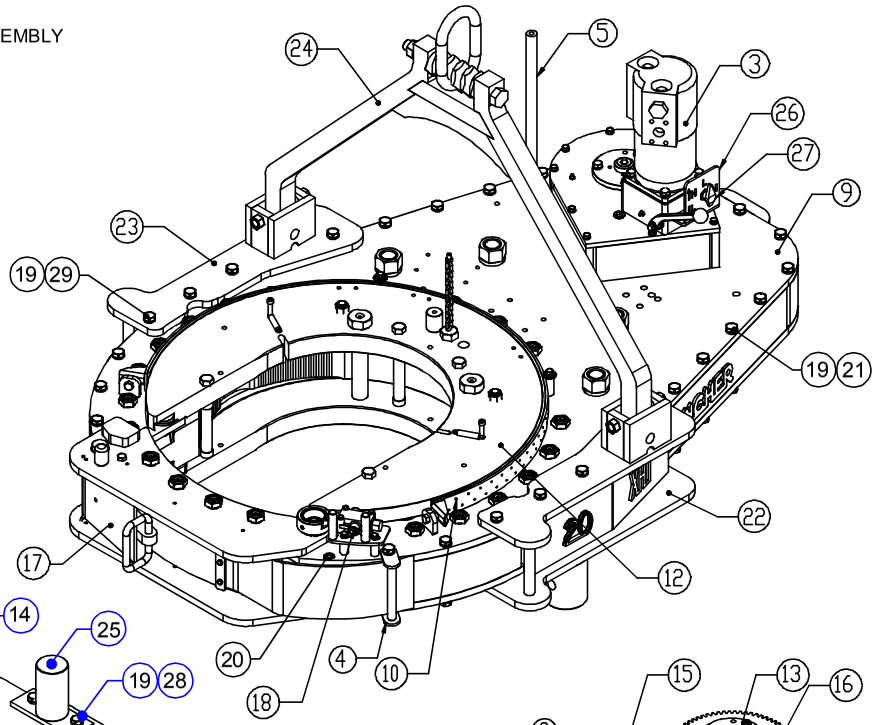
COMBO JAW PUSHER ASSEMBLY & LOW FRICTION COMBO JAW PUSHER ASSEMBLY *(Assy. No. 20115 & 20115-LF)* ..... 9 - 26

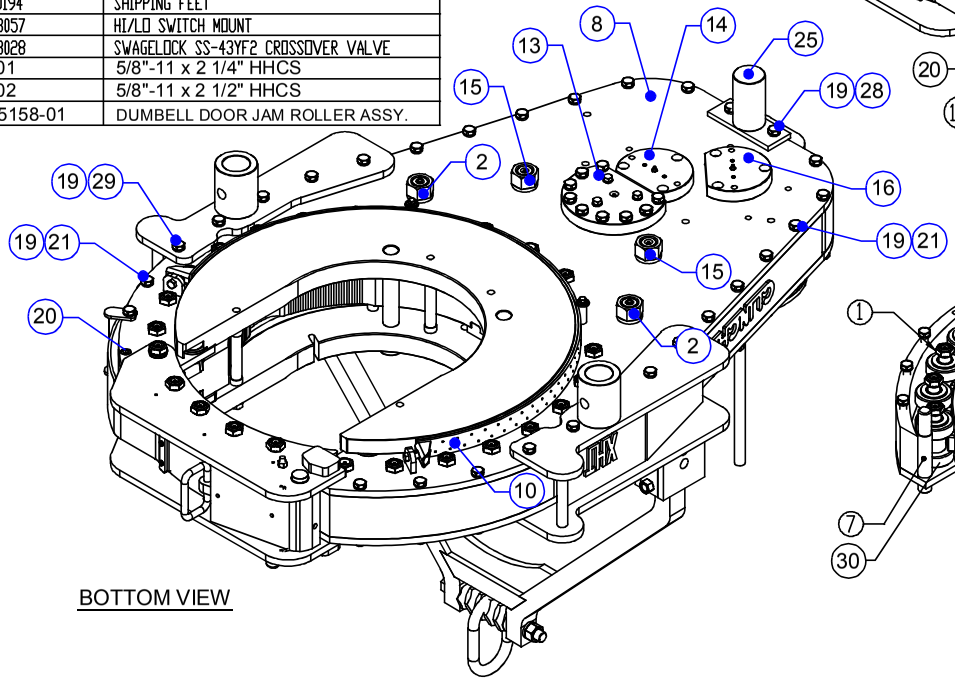
COMBO DOVETAIL JAW ASSEMBLY *(5" thru 8 5/8") (Assy. No. 20117-XXXXXA)* ..... 9 - 27

20HT DOVETAIL JAW ASSEMBLY *(7 5/8" - 20") (Assy. No. CJDT20HXXXXX)* ..... 9 - 28

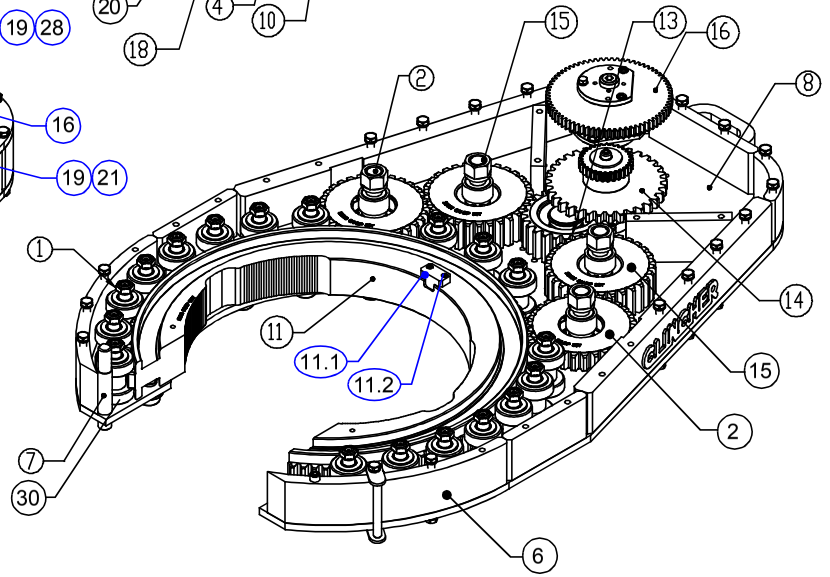
Item #	Qty.	Part Number	Part Name
1	17	55158	SEVERE SERVICE DUMBELL ROLLER ASSEMBLY
2	2	55168	OUTBOARD IDLER ASSEMBLY
3	1	55188-02	MOTOR GEAR BOX ASSEMBLY
4	1	55207	DOOR FLAP RETAINER WELDMENT
5	1	58038	GAUGE MOUNT
6	1	2004-02	MIDBODY
7	1	2011-01	DOOR JAM PIN
8	1	20053	BOTTOM TONG PLATE ASSEMBLY
9	1	20054	TOP TONG PLATE ASSEMBLY
10	2	20056	BRAKE BAND WELDMENT
11	1	20058	RING GEAR ASSEMBLY - INCLUDES:
11.1	1	20072	RING GEAR KEY
11.2	2	1041	3/8"-16 x 1" SHCS
12	1	20068-01	CAGE PLATE ASSEMBLY
13	1	20178-01	MID IDLER ASSEMBLY
14	1	20088	PINION GEAR ASSEMBLY
15	2	20190	OUTBOARD IDLER ASSEMBLY
16	1	20098	SECONDARY GEAR ASSEMBLY
17	1	20106	20" XHT-01 LATCHING DOOR ASSEMBLY
18	1	26681	DOOR VALVE ASSEMBLY
19	56	1151	5/8 LW
20	2	1153	5/8"-11 X 1" SHCS
21	36	1158	5/8-11 x1 3/4 HHCS
22	1	MK20014	RIGHT HANDLE WELDMENT
23	1	MK20013	LEFT HANDLE WELDMENT
24	1	26728	BAIL ASSEMBLY
25	1	20194	SHIPPING FEET
26	1	73057	HI/LO SWITCH MOUNT
27	1	73028	SWAGELOCK SS-43YF2 CROSSOVER VALVE
28	2	201	5/8"-11 x 2 1/4" HHCS
29	18	202	5/8"-11 x 2 1/2" HHCS
30	1	55158-01	DUMBELL DOOR JAM ROLLER ASSY.

NOT SHOWN:
(1) 55142 ENCODER ASSEMBLY





BOTTOM VIEW



20" XHT TONG ASSEMBLY

CLE20000XHT-02

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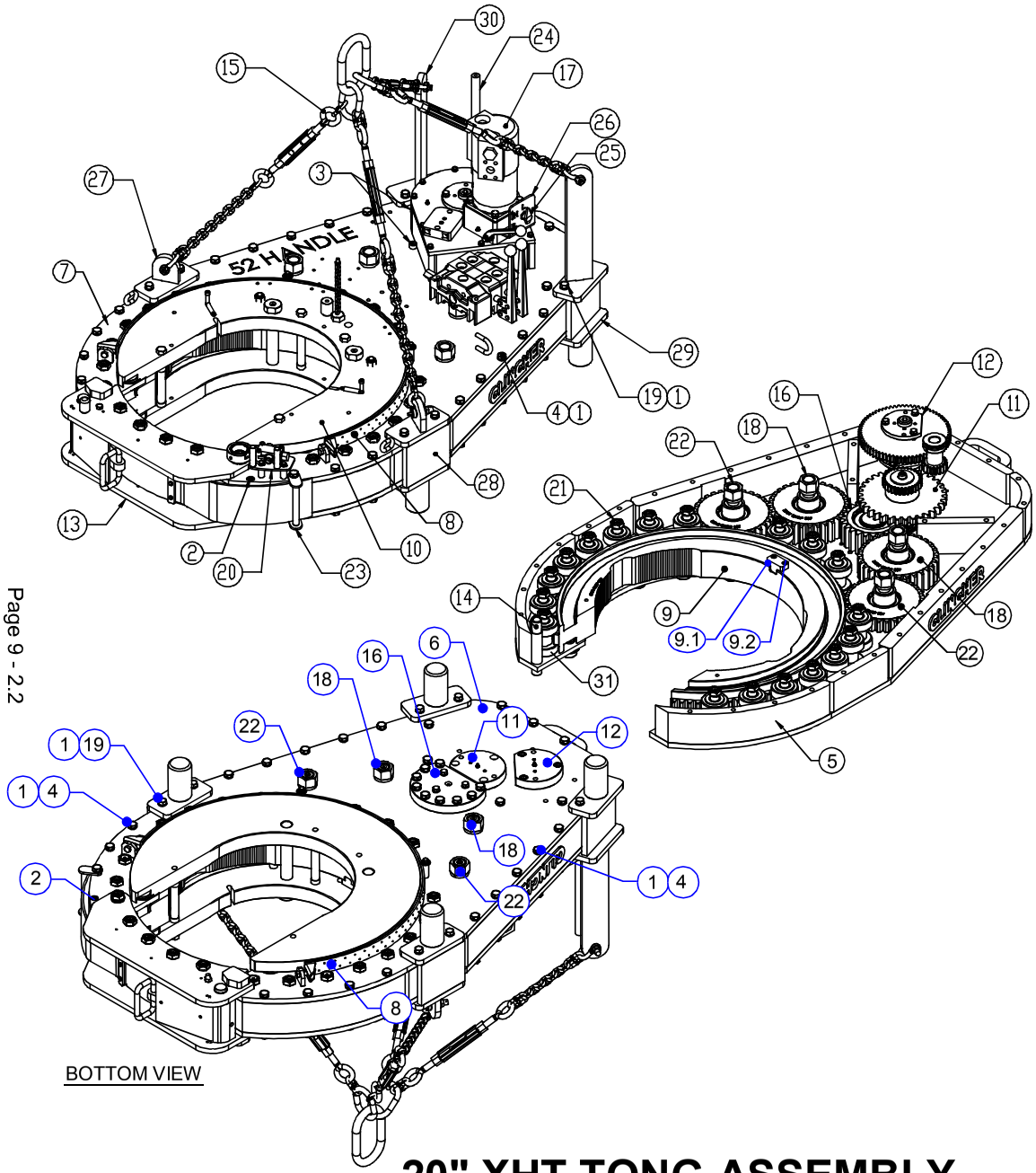

Item #	Qty.	Part Number	Part Name
1	64	1151	5/8 LW
2	2	1153	5/8"-11 X 1" SHCS
3	2	1155	5/8"-11 X 2" SHCS
4	48	1158	5/8-11 x1 3/4 HHCS
5	1	2004-02	MIDBODY
6	1	20053	BOTTOM TONG PLATE ASSEMBLY
7	1	20054-01	TOP TONG PLATE ASSEMBLY
8	2	20056	BRAKE BAND WELDMENT
9	1	20058	RING GEAR ASSEMBLY - INCLUDES:
9.1	1	20072	RING GEAR KEY
9.2	2	1041	3/8"-16 x 1" SHCS
10	1	20068-01	CAGE PLATE ASSEMBLY
11	1	20088	PINION GEAR ASSEMBLY
12	1	20098	SECONDARY GEAR ASSEMBLY
13	1	20106	20" XHT-01 LATCHING DOOR ASSEMBLY
14	1	2011-01	DOOR JAM PIN
15	1	20150	BRIDLE ASSEMBLY
16	1	20178-01	MID IDLER ASSEMBLY
17	1	20188	MOTOR GEAR BOX ASSEMBLY
18	2	20190	OUTBOARD IDLER ASSEMBLY
19	16	203	5/8"-11 x 2 3/4" HHCS
20	1	26681	DOOR VALVE ASSEMBLY
21	17	55158	SEVERE SERVICE DUMBELL ROLLER ASSEMBLY
22	2	55168	OUTBOARD IDLER ASSEMBLY
23	1	55207	DOOR FLAP RETAINER WELDMENT
24	1	58038	GAUGE MOUNT
25	1	73028	SWAGELOCK SS-43YF2 CROSSOVER VALVE
26	1	73057	HI/LO SWITCH MOUNT
27	1	MK20020	LEFT PADEYE/FOOT BRACKET WELDMENT
28	1	MK20021	RIGHT PADEYE/FOOT BRACKET WELDMENT
29	1	MK20022	RIGHT REAR PADEYE/FOOT BRACKET WELDMENT
30	1	MK20023	LEFT REAR PADEYE/FOOT BRACKET WELDMENT
31	1	55158-01	DOOR JAM ROLLER ASSEMBLY

NOT SHOWN:
(1) 55142 ENCODER ASSEMBLY

20" XHT TONG ASSEMBLY

CLE20000XHT-03

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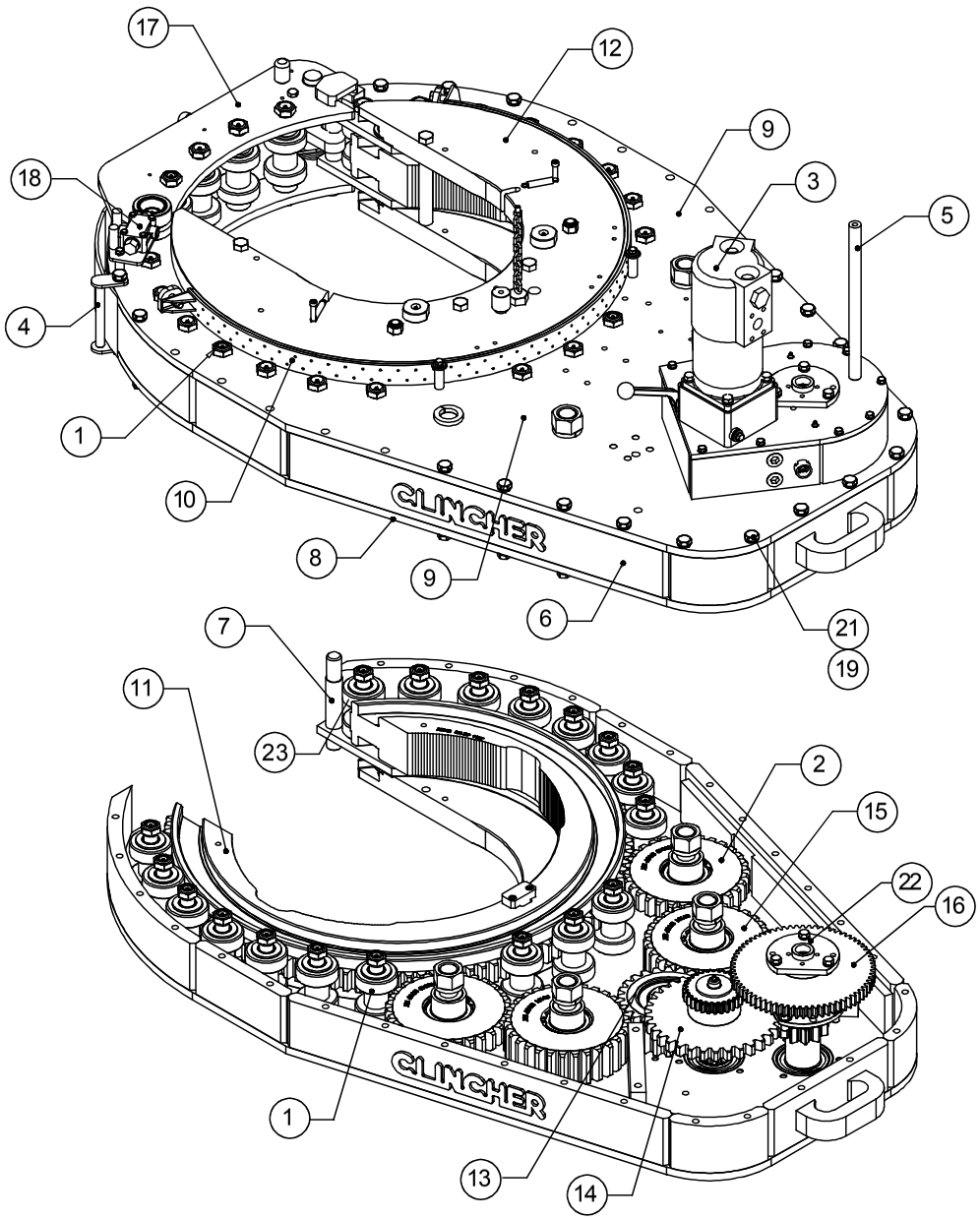

TOP VIEW ASSEMBLY

CLE20000XHT-01

Item #	Qty.	Part Number	Part Name
1	17	55158	SEVERE SERVICE DUMBELL ROLLER ASSEMBLY
2	2	55168	OUTBOARD IDLER ASSEMBLY
3	1	55188-02	MOTOR GEAR BOX ASSEMBLY
4	1	55207	DOOR FLAP RETAINER WELDMENT
5	1	58038	GAUGE MOUNT
6	1	2004-02	MIDBODY
7	1	2011	DOOR JAM PIN
8	1	20053	BOTTOM TONG PLATE ASSEMBLY
9	1	20054	TOP TONG PLATE ASSEMBLY
10	2	20056	BRAKE BAND WELDMENT
11	1	20058	RING GEAR ASSEMBLY
12	1	20068-01	CAGE PLATE ASSEMBLY
13	1	20178	MID IDLER ASSEMBLY
14	1	20088	PINION GEAR ASSEMBLY
15	2	20190	OUTBOARD IDLER ASSEMBLY
16	1	20098	SECONDARY GEAR ASSEMBLY
17	1	20106	20" XHT-01 LATCHING DOOR ASSEMBLY
18	1	26681	DOOR VALVE ASSEMBLY
19	30	1151	5/8 LW
20	2	1153	5/8"-11 X 1" SHCS
21	30	1158	5/8-11 x1 3/4 HHCS
22	1	55142	ENCODER ASSEMBLY (NOT SHOWN)
23	1	55158-01	DOOR JAM ROLLER ASSEMBLY

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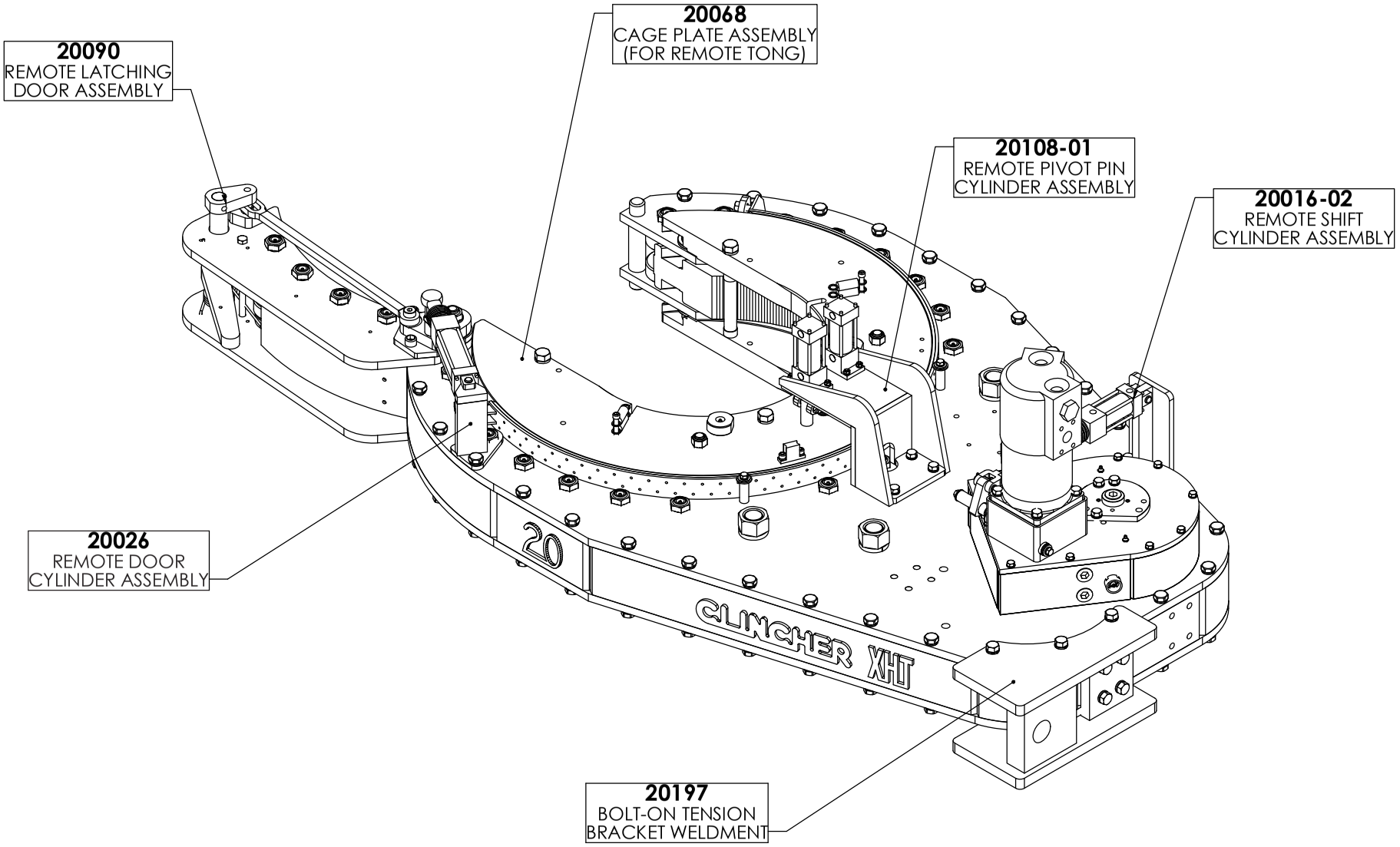

20" XHT 85K REMOTE TONG

CLE20000XHT-04

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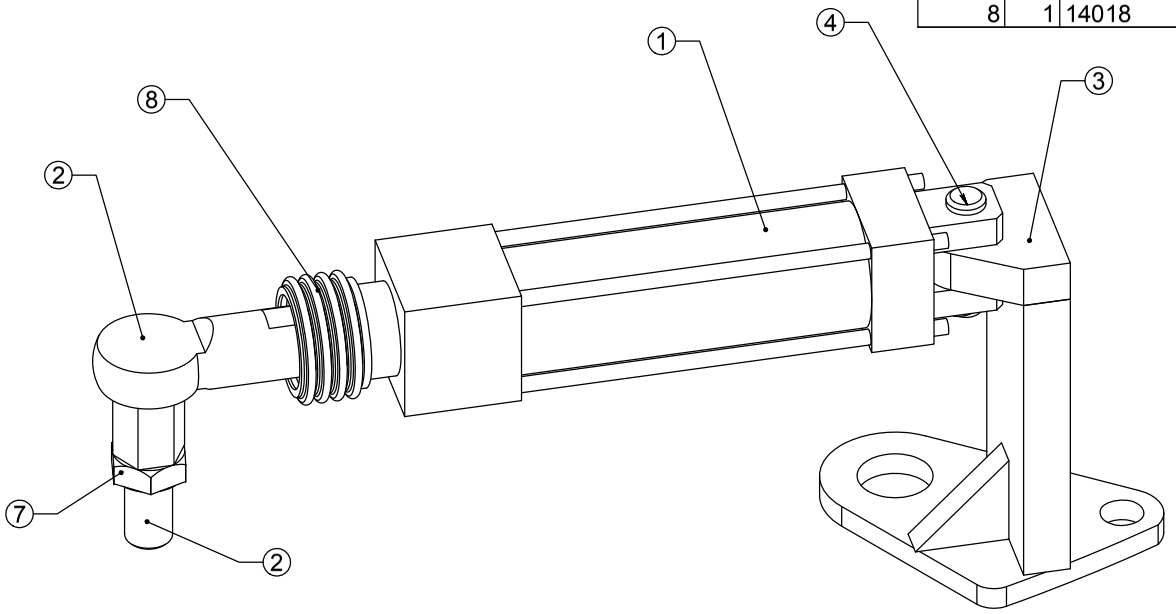
Item #	Qty.	Part Number	Part Name
1	1	2043	REMOTE DOOR CYLINDER LH-1 1/2-BO2- 4 1/2-1-P1
2	1	2044	BALL JOINT ROD END (REID# SPF-12S)
3	1	2045	DOOR CYLINDER MOUNT WELDMENT
* 4	1	10041	CLEVIS PIN (Reid # CLP-172S)
* 5	1	1252B	1/8 x 1 SS COTTER PIN
* 6	1	2046	08DU10
7	1	1170	3/4"-16 JAM NUT
8	1	14018	ROD BOOT

* SOME ITEMS NOT VISIBLE



DOOR CYLINDER ASSEMBLY

CLE20000XHT-04

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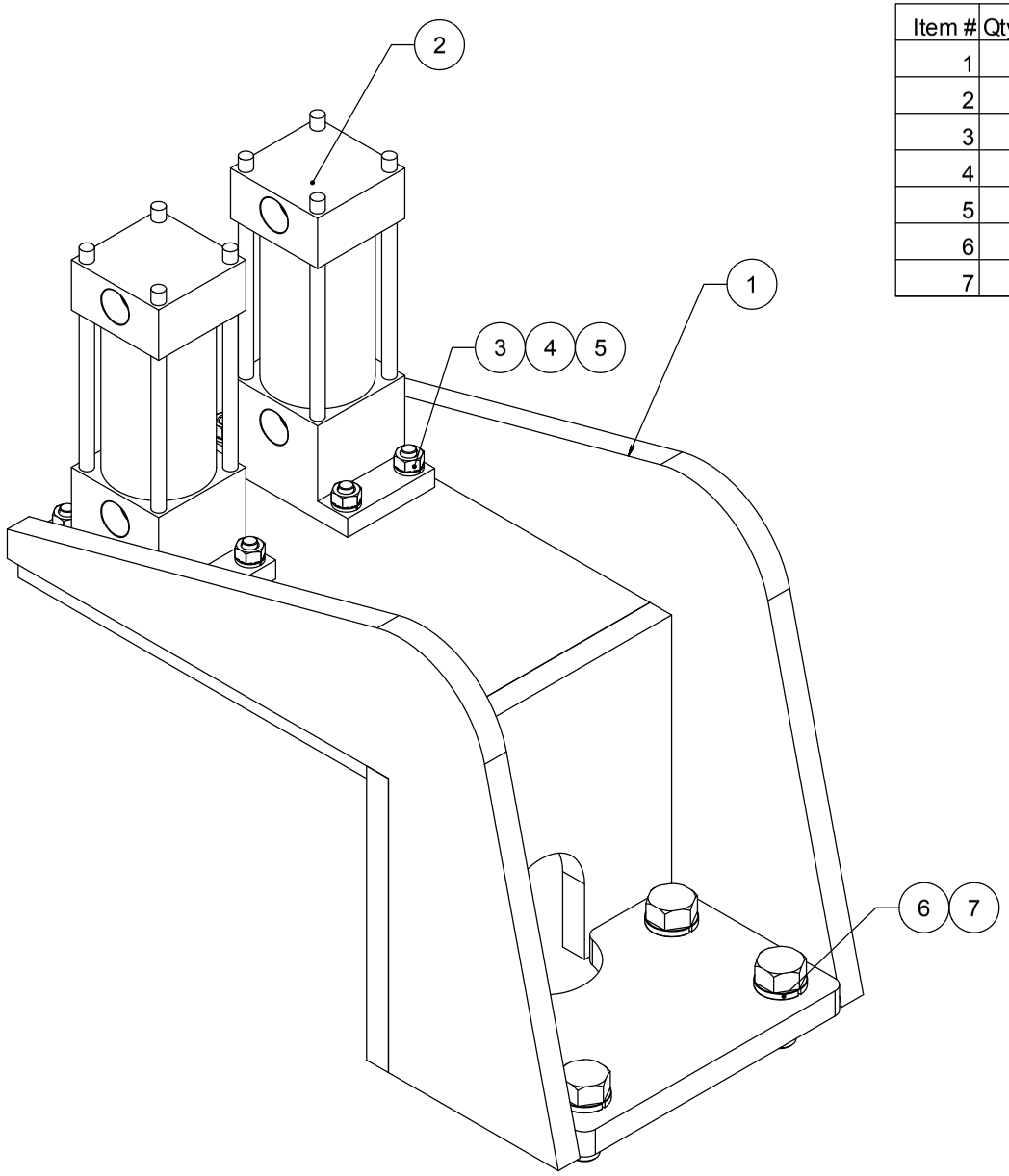

Item #	Qty.	Part Number	Part Name
1	1	20067	REVERSING PIN CYLINDER BRACKET
2	2	13606	1 1/2 Bore X 5/8 Rod X 2 Stk. Hyd.Cylinder
3	8	100	1/4"-20 HEX NUT GR8
4	8	101	1/4" LOCKWASHER
5	8	106	1/4"-20 X 1 1/4" HHCS GR8
6	4	1103	1/2" LOCKWASHER
7	4	1111	1/2"-13 x 1 1/4" HHCS

PIVOT CYLINDER ASSEMBLY

CLE20000XHT-04

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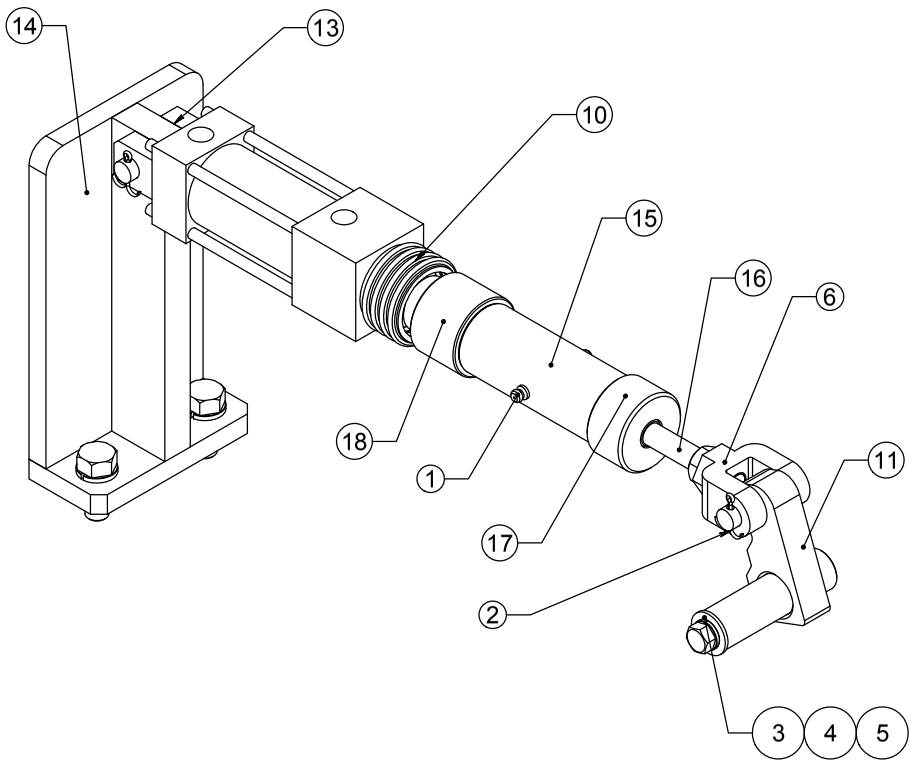

Item #	Qty.	Part Number	Part Name
1	2	1004	3/16 DRIVE ZERT
2	2	10041	CLEVIS PIN (Reid # CLP-172S)
3	1	1025	3/8 FLAT WASHER
4	1	1027	WASHER, LOCK 3/8"
5	1	1071	3/8"-16 X 3 1/2" HHCS
6	1	1099	ROD CLEVIS (RC-0605
7	2	1103	1/2" LOCKWASHER
8	2	1111	1/2"-13 x 1 1/4" HHCS
9	2	1252B	1/8 x 1 SS COTTER PIN
10	1	14018	ROD BOOT
11	1	20020	SHIFTER ARM WELDMENT
12	1	2046	1/2" x 5/8 DU BEARING (2046)
13	1	2047	REMOTE SHIFT CYLINDER (LH-1_1_2-B02-2-1-P 1)
14	1	2059	REAR MOUNTING BRKT
15	1	2079	SPRING HOUSING
16	1	2080-01	PISTON ROD
17	1	2081	FRONT END CAP
18	1	2082	REAR END CAP
19	1	270-B	1/2"-20 JAM NUT
20	1	959-1	1/2" ROD WIPER
21	80	BUCS4024	BELVILLE SPRING

NOTE: SOME ITEMS NOT VISIBLE

REMOTE SHIFT CYLINDER ASSEMBLY

CLE20000XHT-04

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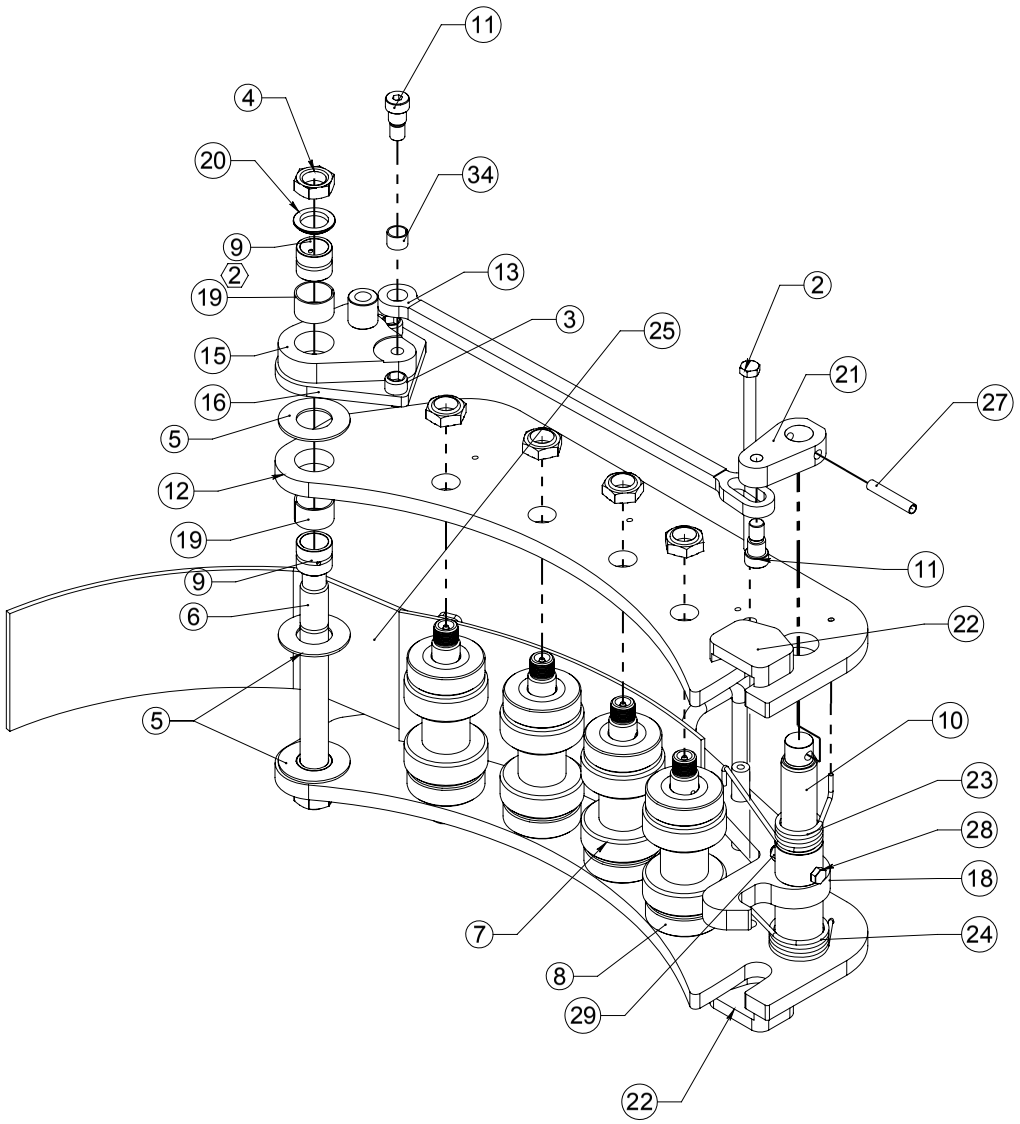

Item #	Qty.	Part Number	Part Name
1	1	1101	NUT, HEX, 1/2-13
2	1	1122	HHCS 1/2"-13 X 9" GR8
3	2	1153-A	5/8-11 x 3/4 SHCS
4	2	1323	1-14 NYLOCK JAM NUT (1323)
5	3	14116	DOOR THRUST BUSHING
6	1	14144	DOOR PIVOT SHAFT
7	4	14148	DUMBELL ROLLER ASSEMBLY
8	8	14676	DOOR ROLLER SPACER
9	3	14679	DOOR PIVOT BUSHING
10	1	14682	DOOR LATCH PIVOT PIN
11	2	1676	3/4 x 5/8 SS SHOULDER BOLT 5/8-11 NC
12	2	20096	TOP/BOTTOM DOOR PLATE
13	1	20097	DOOR LATCH LINKAGE
14	1	20101-S1	ROLLER GUARD
15	1	20207	BELL CRANK WELDMENT
16	1	20208	BELL CRANK STOP PLATE
17	1	2040	DOOR BUSHING
18	1	20125	LATCH WELDMENT F/20" XHT
19	3	2021	1 1/2 x 1 DU BEARING (2021)
20	1	55125	DOOR THRUST SPACER
21	1	82042	ARM
22	2	86006-S3-01	TOP/BOTTOM DOOR DOUBLER
23	1	SMH1501-N	TORSION SPRING
24	1	SMH1501-O	TORSION SPRING
25	1	20120	RUBBER GUARD
26	1	14151	SUPPORT STRIP
27	1	1123	7/16" x 2 1/2" ROLL PIN
28	1	160	HHCS 7/16-14 x 2 1/2"
29	1	292	7/16"-14 NYLOCK NUT
30	3	100	1/4"-20 HEX NUT GR8
31	3	101	1/4" LOCKWASHER
32	3	1008-B2	1/4" FLATWASHER
33	3	106	1/4"-20 X 1 1/4" HHCS GR8
34	1	82046	GARLOCK BUSHING 12DU10

REMOTE DOOR ASSEMBLY

ASSEMBLY NO. 20090

(FOR TONGS MANUFACTURED BEFORE 10/2009)

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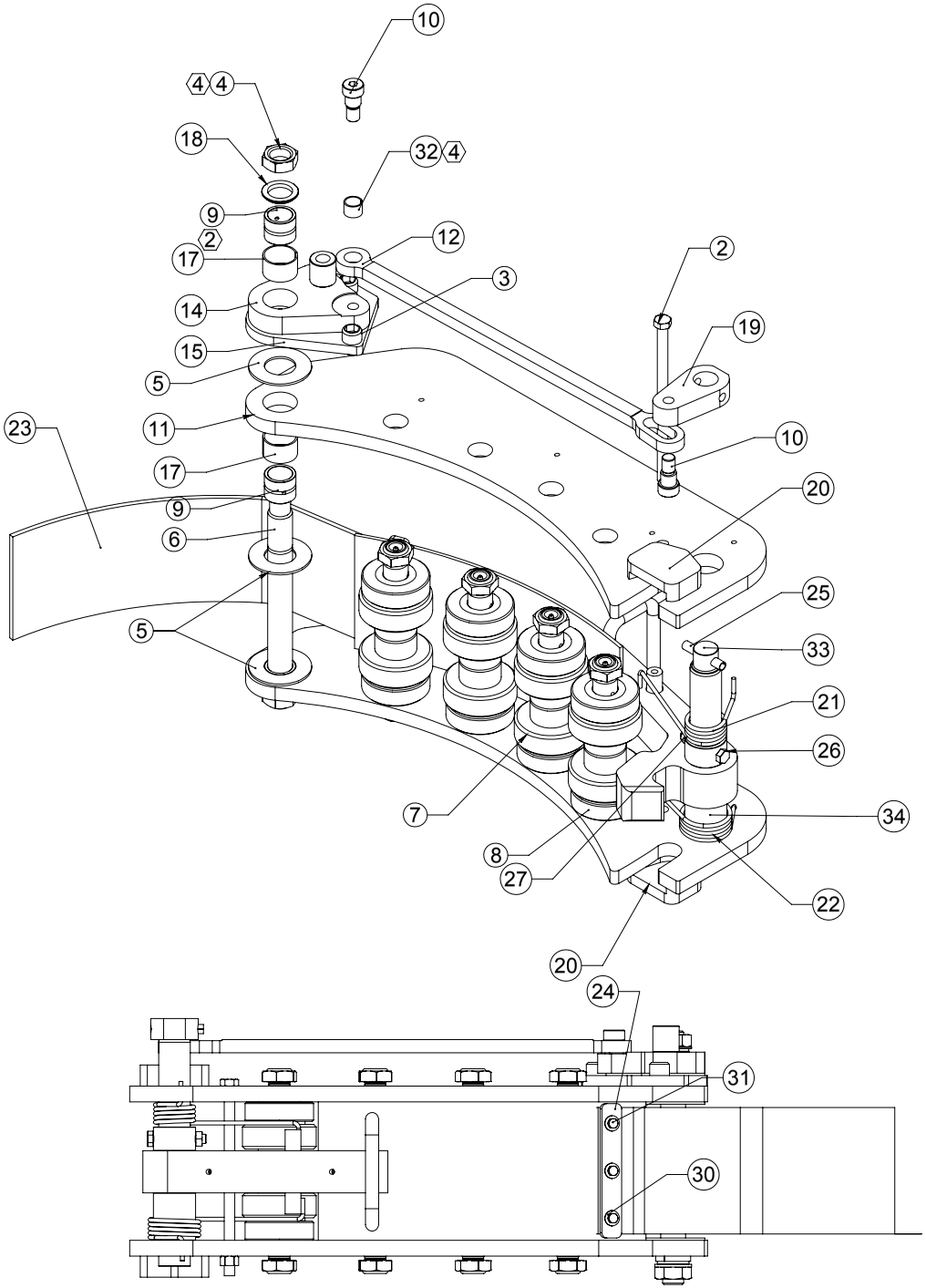

Item #	Qty.	Part Number	Part Name
1	1	1101	NUT, HEX, 1/2-13
2	1	1122	HHCS 1/2"-13 X 9" GR8
3	2	1153-A	5/8-11 x 3/4 SHCS
4	2	1323	1-14 NYLOCK JAM NUT (1323)
5	3	14116	DOOR THRUST BUSHING
6	1	14144	DOOR PIVOT SHAFT
7	4	14148	DUMBELL ROLLER ASSEMBLY
8	8	14676	DOOR ROLLER SPACER
9	3	14679	DOOR PIVOT BUSHING
10	2	1676	3/4 x 5/8 SS SHOULDER BOLT 5/8-11 NC
11	2	20096	TOP/BOTTOM DOOR PLATE
12	1	20097	DOOR LATCH LINKAGE
13	1	20101-S1	ROLLER GUARD
14	1	20207	BELL CRANK WELDMENT
15	1	20208	BELL CRANK STOP PLATE
16	1	2040	DOOR BUSHING
17	3	2021	1 1/2 x 1 DU BEARING (2021)
18	1	55125	DOOR THRUST SPACER
19	1	82042	ARM
20	2	86006-S3-01	TOP/BOTTOM DOOR DOUBLER
21	1	SMH1501-N	TORSION SPRING
22	1	SMH1501-O	TORSION SPRING
23	1	20120	RUBBER GUARD
24	1	14151	SUPPORT STRIP
25	1	1123	7/16" x 2 1/2" ROLL PIN
26	1	160	HHCS 7/16-14 x 2 1/2"
27	1	292	7/16"-14 NYLOCK NUT
28	3	100	1/4"-20 HEX NUT GR8
29	3	101	1/4" LOCKWASHER
30	3	1008-B2	1/4" FLATWASHER
31	3	106	1/4"-20 X 1 1/4" HHCS GR8
32	1	82046	GARLOCK BUSHING 12DU10
33	1	20209	DOOR LATCH PIVOT PIN - 20XHT
34	1	20212	DOOR LATCH BOTTOM SPACER
35	1	20125-01	LATCH WELDMENT F/20" XHT

REMOTE DOOR ASSEMBLY

ASSEMBLY NO. 20090

(FOR TONGS MANUFACTURED AFTER 10/2009)

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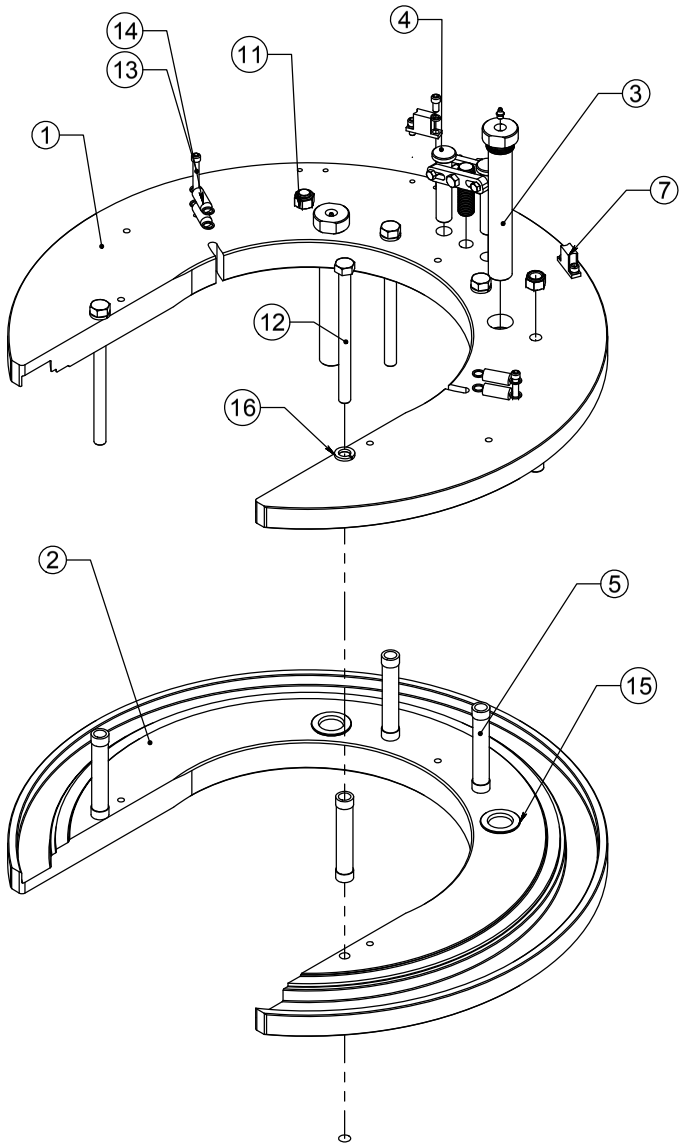
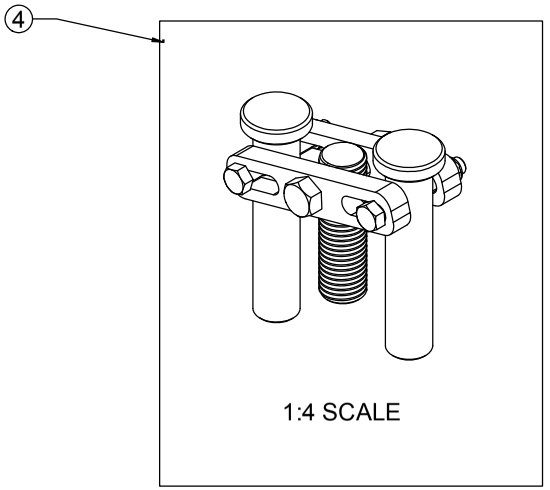


Item #	Qty.	Part Number	Part Name
1	1	20019	TOP CAGE PLATE
2	1	20022	BOTTOM CAGE PLATE
3	2	20043	JAW PIVOT PIN
4	1	20057	REVERSING PIN ASSEMBLY
5	4	20066	CAGE PLATE SPACER
6	2	20069	RING GEAR STOP
7	2	CRSS20094	CAGE PLATE SENSOR TARGET
8	2	1001	1/8 NPT ZERT
9	4	1026	3/8 HI COLLAR LW
10	4	1040-A	3/8-16 x 3/4 SHCS
11	2	1167	3/4-10 NYLOCK HEX NUT
12	4	1266	3/4"-10 X 10" HHCS
13	2	240	3/8-16 x 2 1/2 SHCS
14	4	2038-01	SPRING .75 OD x 3 L x .093W x20 #/IN x 1.9 MAX. DEFL.
15	2	26024	JAW PIVOT SPACER
16	4	1171	3/4" LOCKWASHER



CAGE PLATE ASSEMBLY

CLE20000XHT-04

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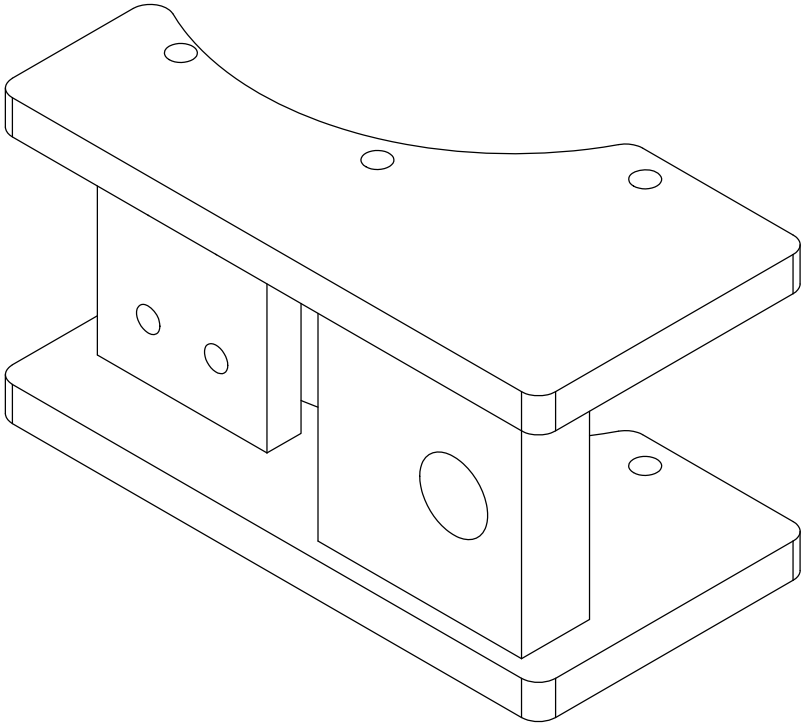
REV. #	LOG #	DATE



*PART IS REVERSIBLE FROM LEFT TO RIGHT

TENSION BRACKET WELDMENT

CLE20000XHT-04

SUPERIOR Manufacturing & Hydraulics
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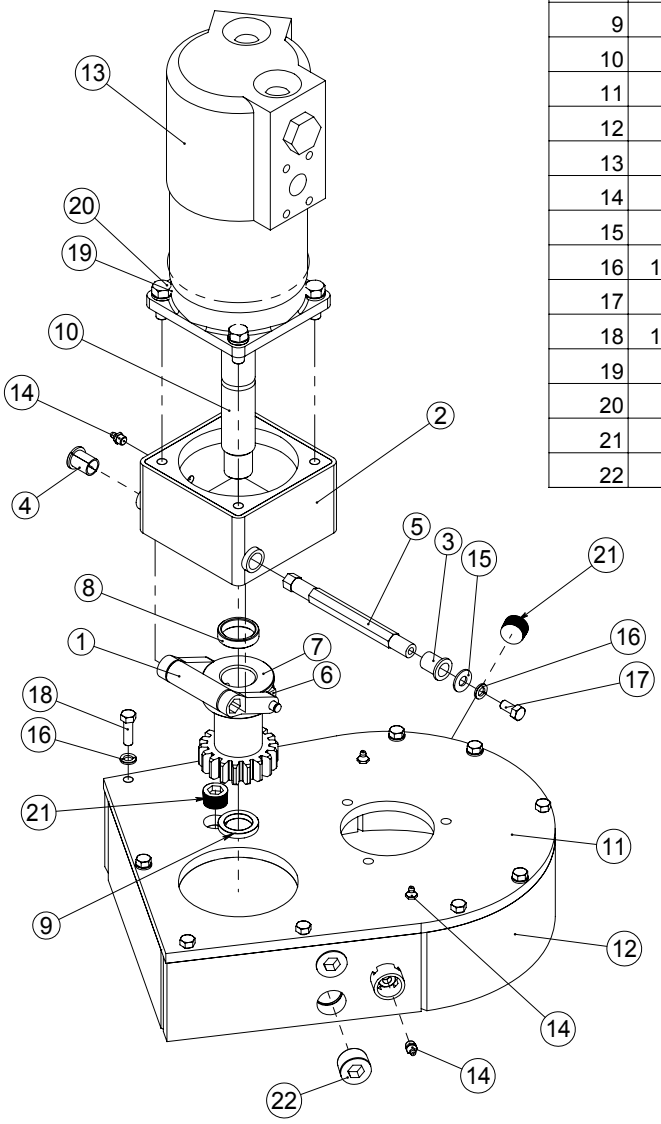
REV. #	LOG #	DATE

Item #	Qty.	Part Number	Part Name
1	1	45072-01	SHIFTING YOKE WELDMENT
2	1	55076	SHIFTING BOX WELDMENT
3	1	45092	5/8 x 3/4 SELF-LUB. FLANGE BEARING (FF-703-1)
4	2	45106	5/8" x 3/4" SPLIT SELF-LUB. FLANGE BEARING.
5	1	45143	SHIFTER SHAFT
6	2	45164	SHIFTING YOKE BEARING PIN
7	1	55084-02	DRIVE GEAR
8	1	55085	MOTOR SPACER
9	1	55121	MOTOR SHAFT BEARING SPACER
10	1	73040-01	MOTOR SHAFT
11	1	14006-01	LOW GEAR HOUSING COVER
12	1	20063	LOW GEAR HOUSING WELDMENT
13	1	20099	RINEER MOTOR 2SP. 30 cu.inch
14	4	1001	1/8 NPT ZERT
15	1	1025	3/8 FLAT WASHER
16	11	1027	WASHER, LOCK 3/8"
17	1	1046	HHCS 3/8-16 X 3/4
18	10	1048	3/8"-16 X 1 1/4" HHCS
19	4	1103	1/2" LOCKWASHER
20	4	1111	1/2"-13 x 1 1/4" HHCS
21	2	1610	3/4 NPT FLUSH PLUG (1610)
22	2	1611	



MOTOR GEAR BOX ASSEMBLY

ASSEMBLY NO. 55188-01

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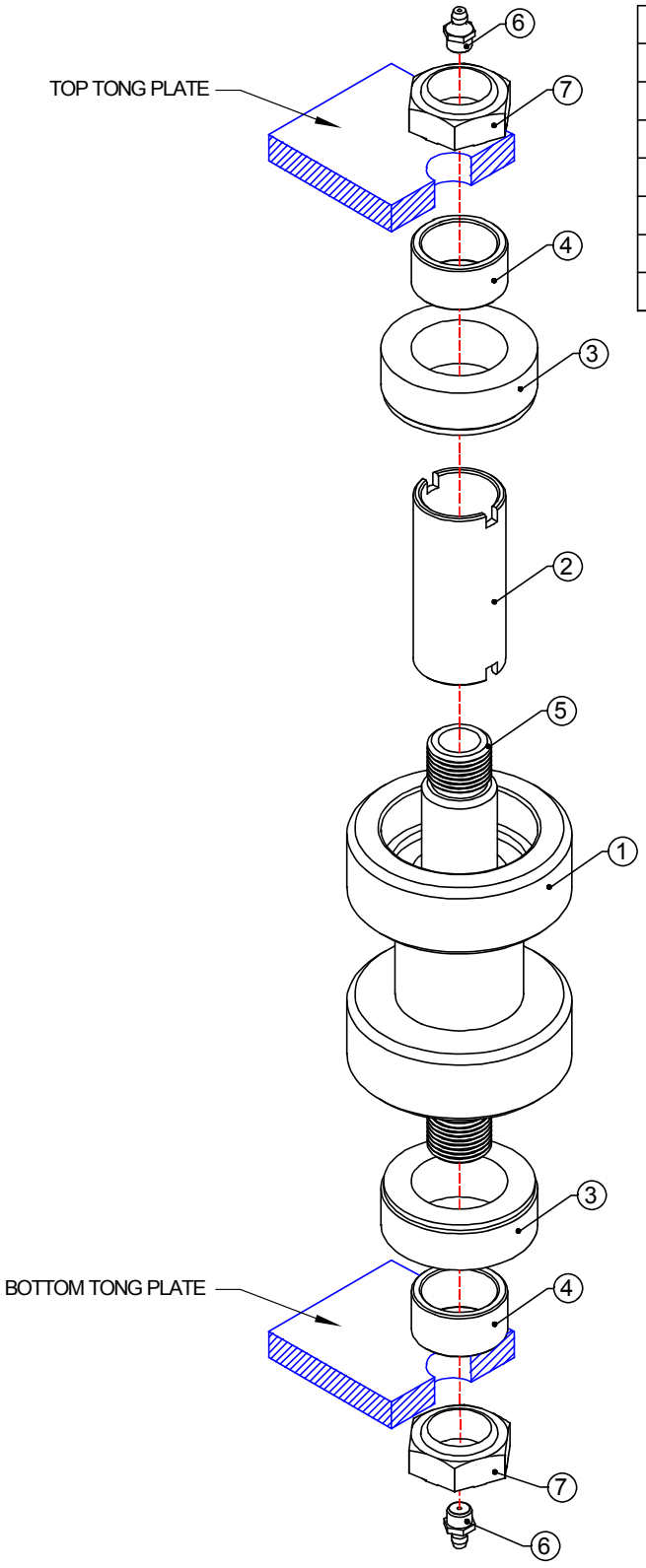
		6/4/09
REV. #	LOG #	DATE



Item #	Qty.	Part Number	Part Name
1	1	55025-B	DUMBELL ROLLER
2	1	55027-D	DUMBELL ROLLER SPACER
3	2	55191	DUMBELL ROLLER BUSHING
4	2	55192	DUMBELL ROLLER SPACER
5	1	76025-A	DUMBELL ROLLER SHAFT
6	2	1001	1/8 NPT ZERT
7	2	1213	1"-12 LOW PROFILE NYLOCK NUT

SEVERE SERVICE DUMBELL ROLLER ASSEMBLY

ASSEMBLY NO. 55158

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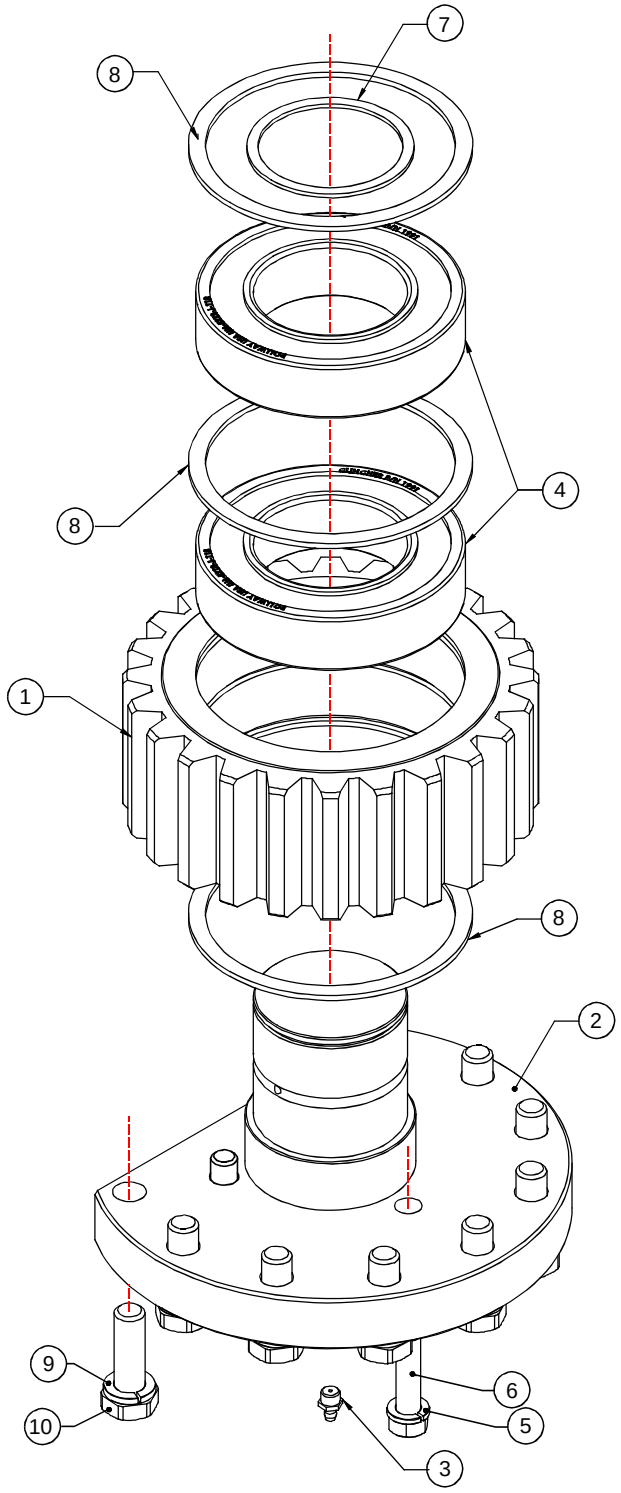
REV. #	LOG #	DATE
2		08/22/05

REF: S:\Equip Manuals-Dwgs\CLE5500\Dumbell Roller 4th rev2.wpg



ASSEMBLY NO. 20178
MFG. STARTING 07/2005

Item	*Qty.*	*Part Number*	*Description*
1	1	20179	IDLER GEAR
2	1	20180	IDLER SHAFT
3	1	1001	1/8" NPT ZERT
4	2	1991	BEARING
5	3	1103	1/2" LOCKWASHER
6	3	1112-A	1/2"-13 x 2" HHCS
7	1	1944	EXTERNAL RETAINING RING
8	3	1987	INTERNAL RETAINING RING
9	9	1151	5/8" LOCKWASHER
10	9	1160	5/8"-11 x 2" HHCS

ASSEMBLY NO. 20178-01
MFG. STARTING 10/2006

Item	*Qty.*	*Part Number*	*Description*
1	1	20179	IDLER GEAR
2	1	20180-01	IDLER SHAFT
3	1	1001	1/8" NPT ZERT
4	2	1991	BEARING
5	3	1103	1/2" LOCKWASHER
6	3	1112-A	1/2"-13 x 2" HHCS
7	1	1944	EXTERNAL RETAINING RING
8	3	1987	INTERNAL RETAINING RING
9	9	1151	5/8" LOCKWASHER
10	9	1160	5/8"-11 x 2" HHCS

MID IDLER ASSEMBLY

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REV. #	LOG #	DATE
2		11/14/06

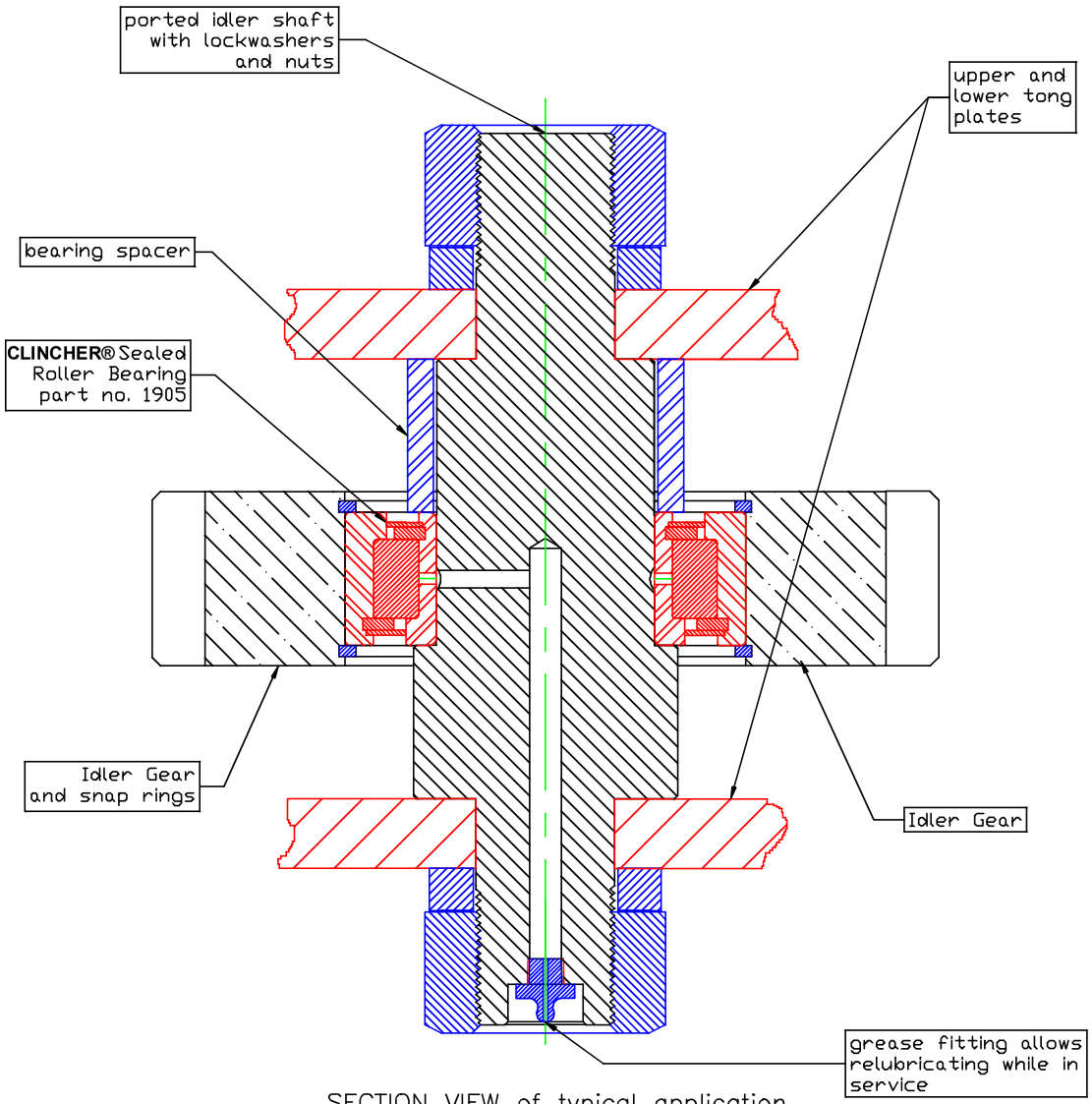
REF: P:\Manuals\Equip Manuals\Dwgs\CLE20000XHT-01\20178 rev2.wpg

Features and Benefits:
Proprietary sealed bearing with full compliment roller design offers greater load ratings than commercially available sealed ball bearings. The ported inner race allows the bearing to be relubricated without disassembly. Integral elastomeric seals allow grease to be displaced but prevent migration of contaiminants into bearing.

Elastomeric seals are corrosion resistant and suitable for use in environments which are incompatible with traditional aluminum bearing shrouds.

Unique geometric design allows rollers to absorb thrust loads to maximize component life.

Nominal OD: 4.3307 inches
Nominal ID: 2.3622 inches
Nominal Ht: 1.4375 inches
static rating: 37540 lbs
dynaminc rating: 29230 lbs
(1mm cycles, 33 1/3 RPM f/ 500 hrs.)


ported idler shaft with lockwashers and nuts
upper and lower tong plates
bearing spacer
CLINCHER® Sealed Roller Bearing part no. 1905
Idler Gear and snap rings
Idler Gear
grease fitting allows relubricating while in service

SECTION VIEW of typical application

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE						R3
2 PLACE DEC. ±.020	3 PLACE DEC. ±.005	FRACTIONS ± 1/16	ANGLES ± .5°	SURFACE 250	FLATNESS AR PL. ± .015 per foot	

1. Dimensions are in inches
2. Remove burrs & sharp edges with 1/64x45°max.
3. Machined fillet radii are 1/32
4. Normality,Squareness & parallelism of machine surfaces are .002 per inch, to a max of .012 inches for a single surface.
5. Machine diameters on a common centerline must be concentric within .005 T.I.R & unmachined diameters concentric within .032 T.I.R

Rev.#	By	Log#	Description of Revision
3			
2			
1	DB	12/07/02	added desc of thrust load capability

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△1 or ⟨1⟩ = Revision Number
1.000 = Critical Dimension 100% Inspection Required

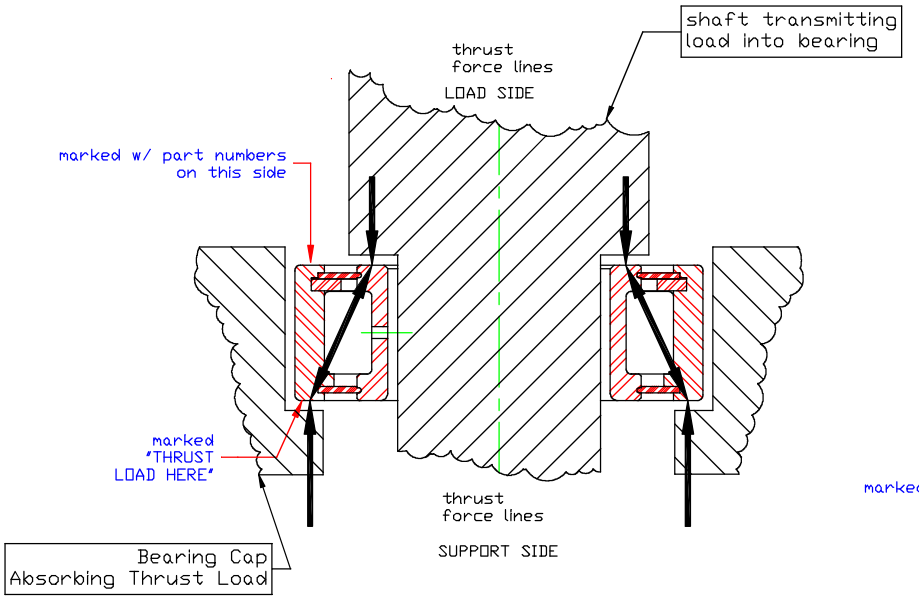
SHEET 1 of 2

SUPERIOR Manufacturing & Hydraulics
4225 HWY.90 E
BROUSSARD,LA 70518
(318)837-8847

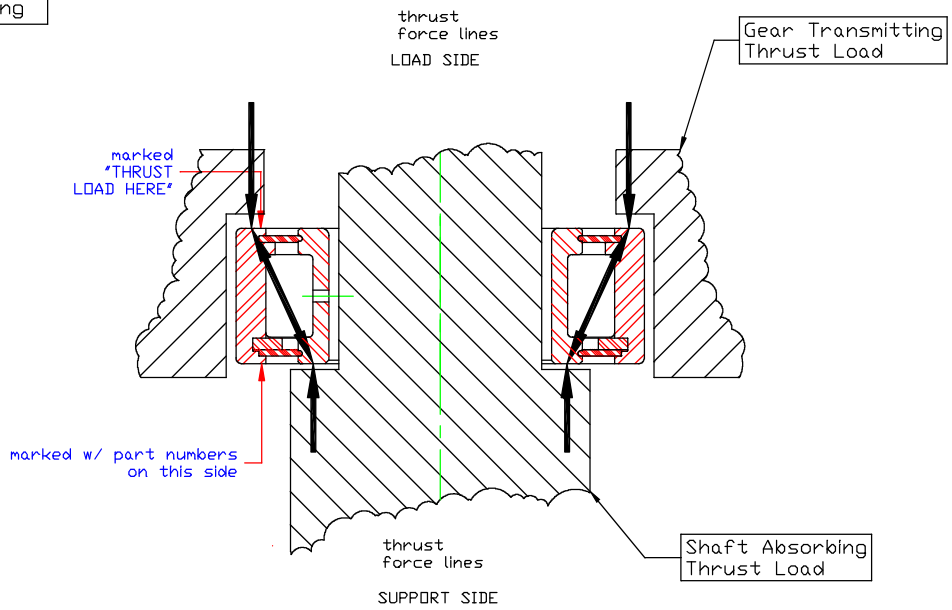
PART NAME: SEALED IDLER BEARING

PART #: 1905
DRAWN BY:
APPROVED BY:
CHK BY: DATE:
REF: ILL1000/ILL1142.DWG

MATERIAL SPECIFICATION
Matl.Req:
Initial Condition:
Alternative Matl:
H.T Instructions: Case Depth: C.D



Bottom Bearing Cap Application



Gear Support Application

Installation instructions for **CLINCHER®** BEARING Part Number 1905

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE					R3
2 PLACE DEC. ±.020	3 PLACE DEC. ±.005	FRACTIONS ± 1/16	ANGLES ± .5°	SURFACE 250	FLATNESS AR PL. ± .015 per foot

1. Dimensions are in inches
2. Remove burrs & sharp edges with 1/64x45°max.
3. Machined fillet radii are 1/32
4. Normality,Squareness & parallelism of machine surfaces are .002 per inch, to a max of .012 inches for a single surface.
5. Machine diameters on a common centerline must be concentric within .005 T.I.R & unmachined diameters concentric within .032 T.I.R

Rev.#	By	Log#	Description of Revision
3			
2			
1	DB	12/07/02	added desc of thrust load capability

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△1 or ⟨1⟩ = Revision Number

1.000 = Critical Dimension 100% Inspection Required

SHEET 2 of 2

SUPERIOR Manufacturing & Hydraulics
4225 HWY.90 E
BROUSSARD,LA 70518
(318)837-8847

PART NAME: Installation instructions for P/N 1905 SEALED IDLER BEARING

PART #: 1905

DRAWN BY:

APPROVED BY:

CHK BY: DATE:

REF: REFILL1000/ILL1142.DWG

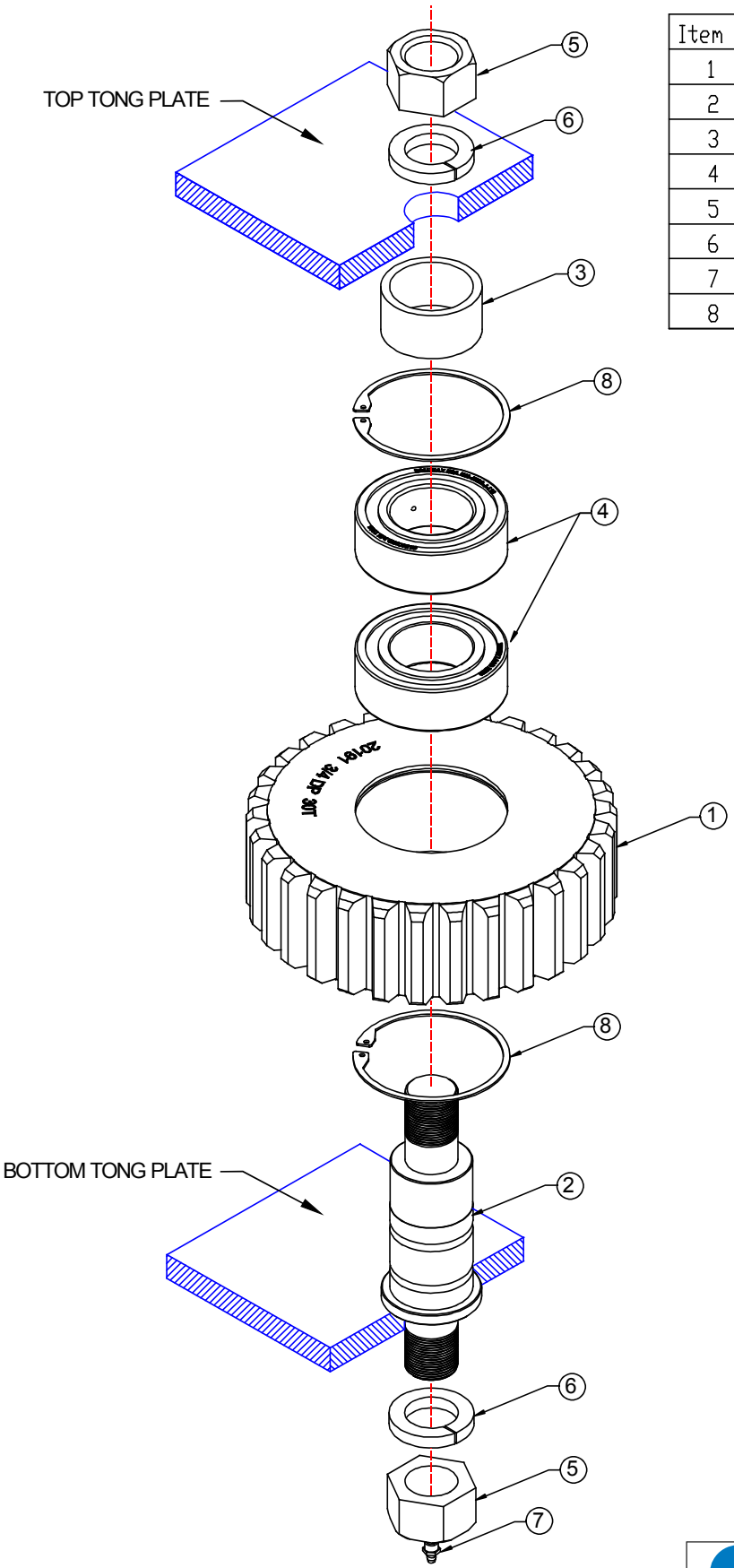
MATERIAL SPECIFICATION

Matl.Req:

Initial Condition:

Alternative Matl:

H.T Instructions: Case Depth: C.D



Item #	Qty.	Part Number	Part Name
1	1	20191	IDLER GEAR
2	1	20192	OUTBOARD IDLER SHAFT
3	1	20193	OUTBOARD IDLER SPACER
4	2	1905	BEARING
5	2	1222	1 1/2"-12 HEX NUT
6	2	1223	1 1/2" LOCKWASHER
7	1	1001	1/8 NPT ZERT
8	2	1926	INTERNAL SNAP RING

OUTBOARD IDLER ASSEMBLY

ASSEMBLY NO. 20190

SUPERIOR Manufacturing & Hydraulics
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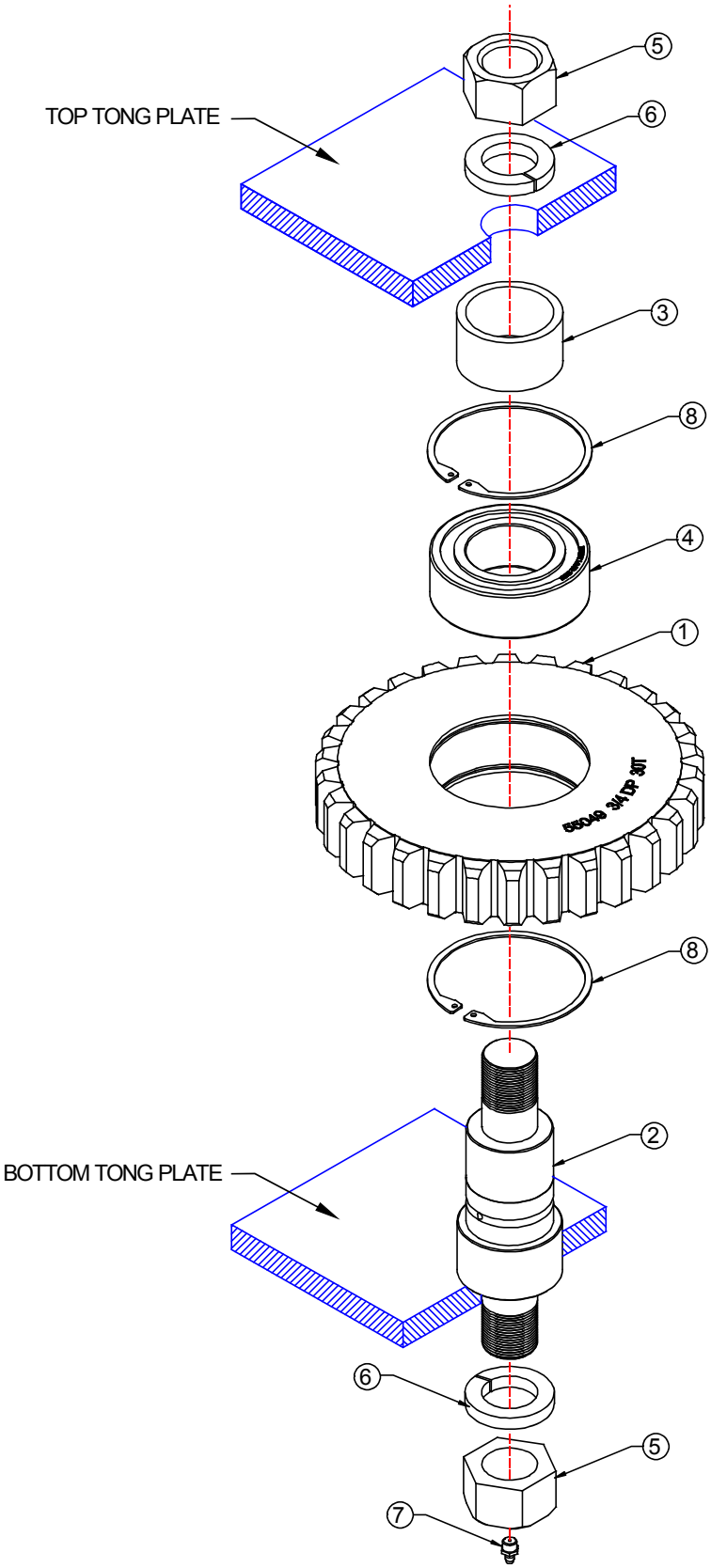
REV. #	LOG #	DATE
		08/23/05

REF: S:\Equip Manuals-Dwgs\CLE20000XHT-01\20190.wpg



Item #	Qty.	Part Number	Part Name
1	1	55049	IDLER GEAR
2	1	76050-01	OUTBOARD IDLER SHAFT
3	1	76097	OUTBOARD IDLER SPACER
4	1	1905	BEARING
5	2	1222	1 1/2"-12 HEX NUT
6	2	1223	1 1/2" LOCKWASHER
7	1	1001	1/8 NPT ZERT
8	2	1926	INTERNAL SNAP RING

OUTBOARD IDLER ASSEMBLY

ASSEMBLY NO. 55168

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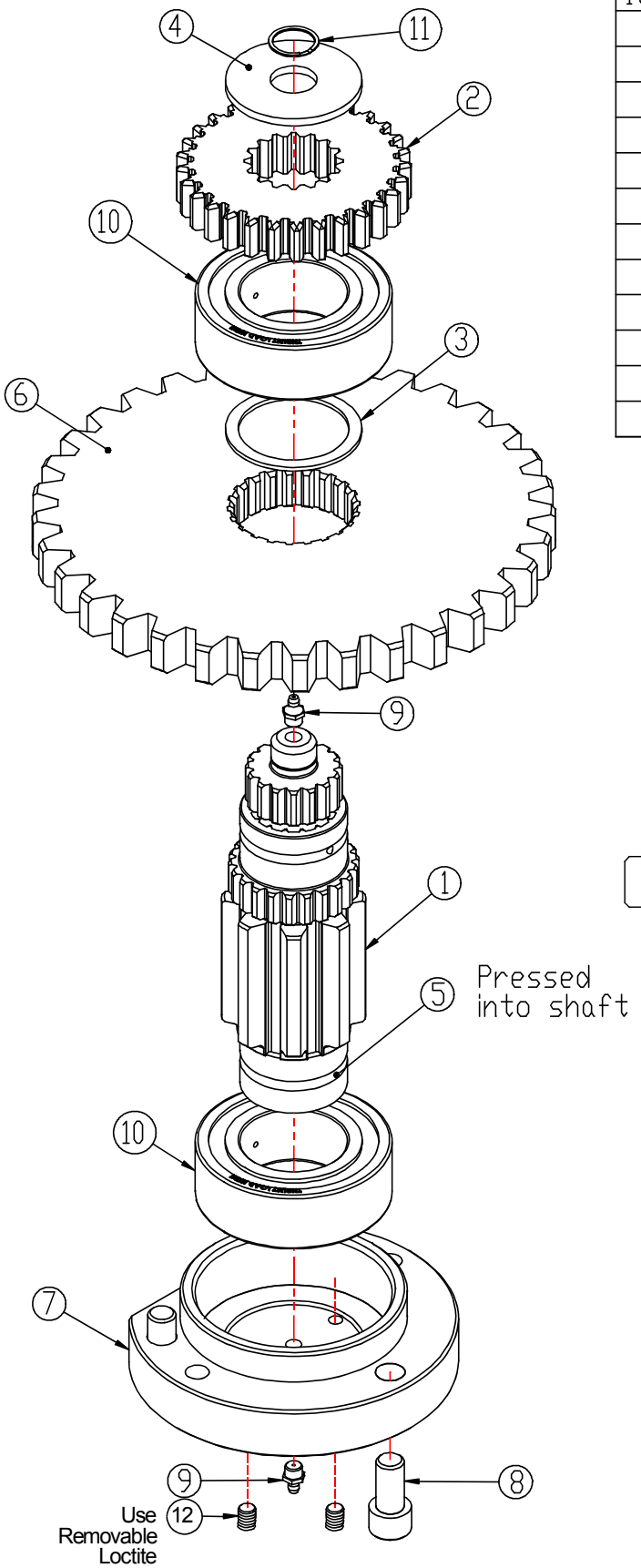
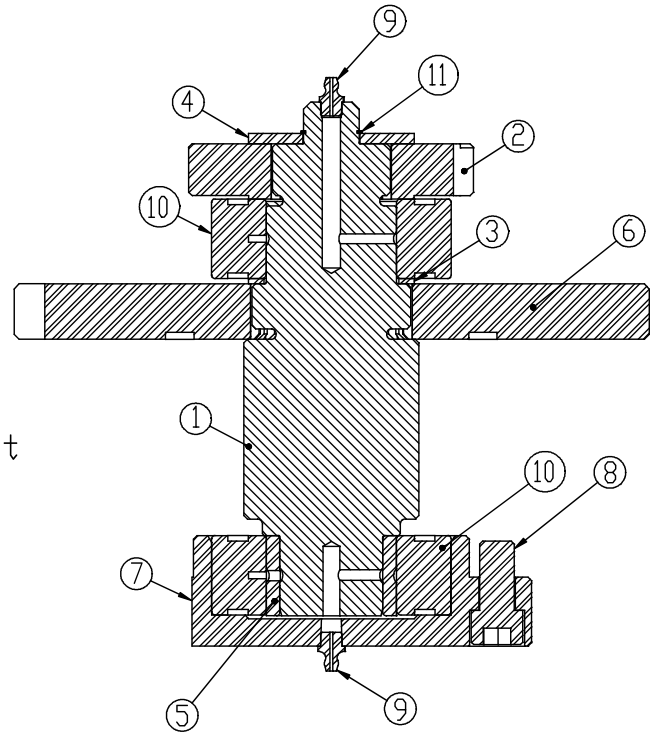
REV. #	LOG #	DATE
2		08/23/05

REF: S:\Equip Manuals-Dwgs\CLE2000-07\55168 rev2.wpg

Item #	Qty.	Part Number	Part Name
1	1	20038	PINION GEAR
2	1	20039	HIGH GEAR
3	1	20044	SPACER
4	1	20045	SPACER
5	1	20047	PINION BEARING SLEEVE
6	1	20061	LOW PINION GEAR
7	1	20081	BEARING CAP
8	3	256	5/8"-11 X 1 1/4" SHCS
9	2	1001	1/8 NPT ZERT
10	2	1905	BEARING
11	1	RSN-100	EXTERNAL SNAP RING
12	2	1029	3/8"-16 X 1/2" SET SCREW





PINION GEAR ASSEMBLY

ASSEMBLY NO. 20088

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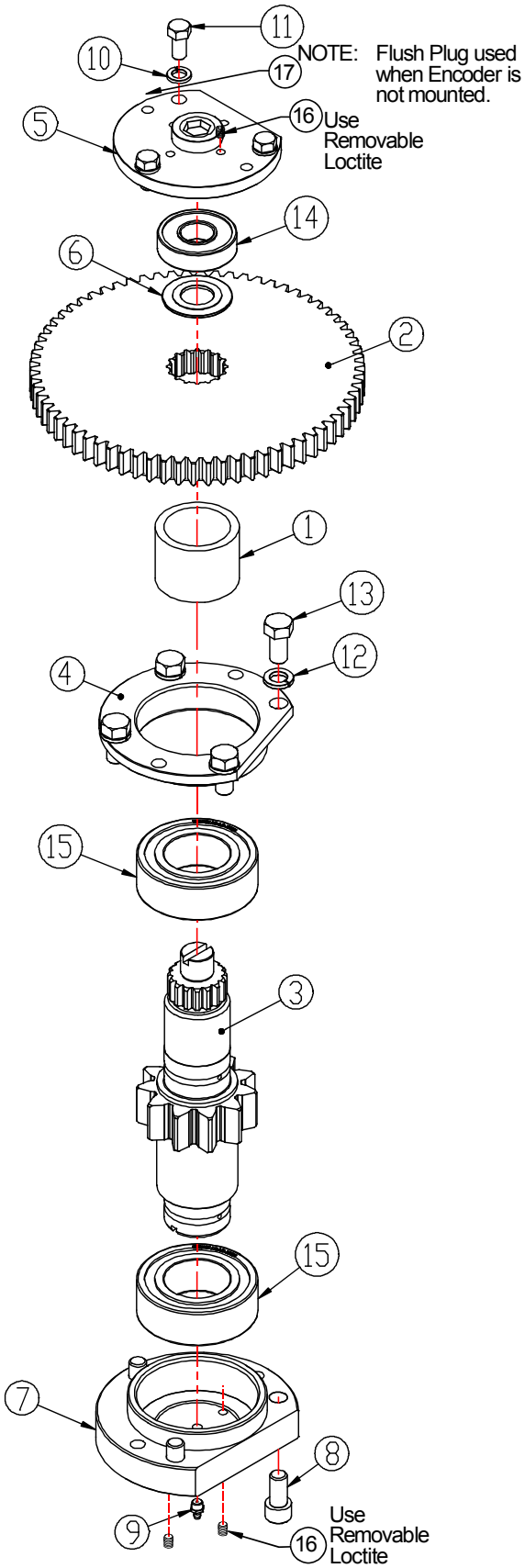
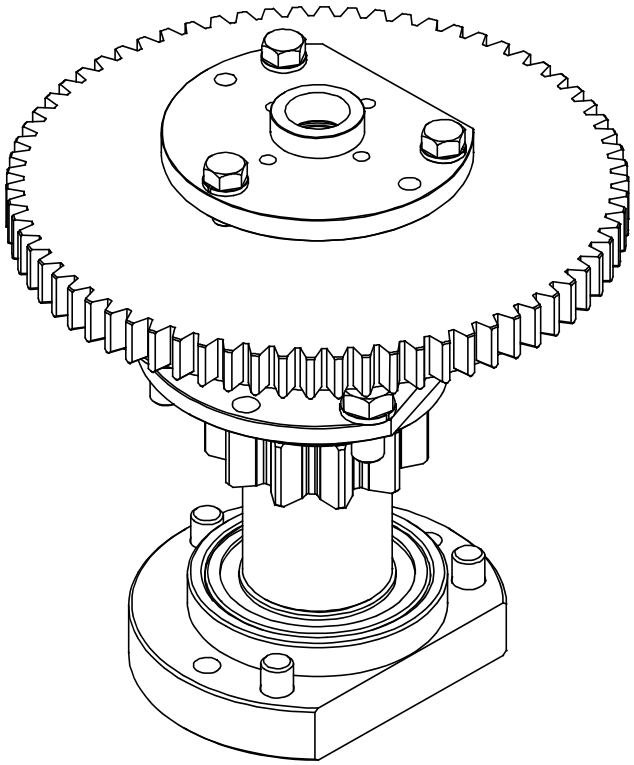
		11/08/04
REV. #	LOG #	DATE

REF: S:\Equip Manuals-Dwgs\CLE14000-10\20088.wpg



Item #	Qty.	Part Number	Part Name
1	1	20036	SPACER
2	1	20046	UPPER LOW PINION GEAR
3	1	20048	SECONDARY INPUT GEAR
4	1	55066-01	BEARING RETAINER
5	1	55143	TOP SECONDARY BEARING CAP
6	1	73098	UPPER LOW PINION UPPER SPACER
7	1	20081	BEARING CAP
8	3	256	5/8"-11 X 1 1/4" SHCS
9	1	1001	1/8 NPT ZERT
10	3	1103	1/2" LOCKWASHER
11	3	1110	1/2"-13 x 1" HHCS
12	4	1151	5/8 LW
13	4	1156	5/8"-11 X 1 1/4" HHCS
14	1	1901	BEARING
15	2	1905	BEARING
16	6	1029	3/8"-16 X 1/2" SET SCREW
17	1	1611	1" NPT FLUSH PLUG



SECONDARY GEAR ASSEMBLY

ASSEMBLY NO. 20098

SUPERIOR Manufacturing & Hydraulics
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		11/08/04
REV. #	LOG #	DATE

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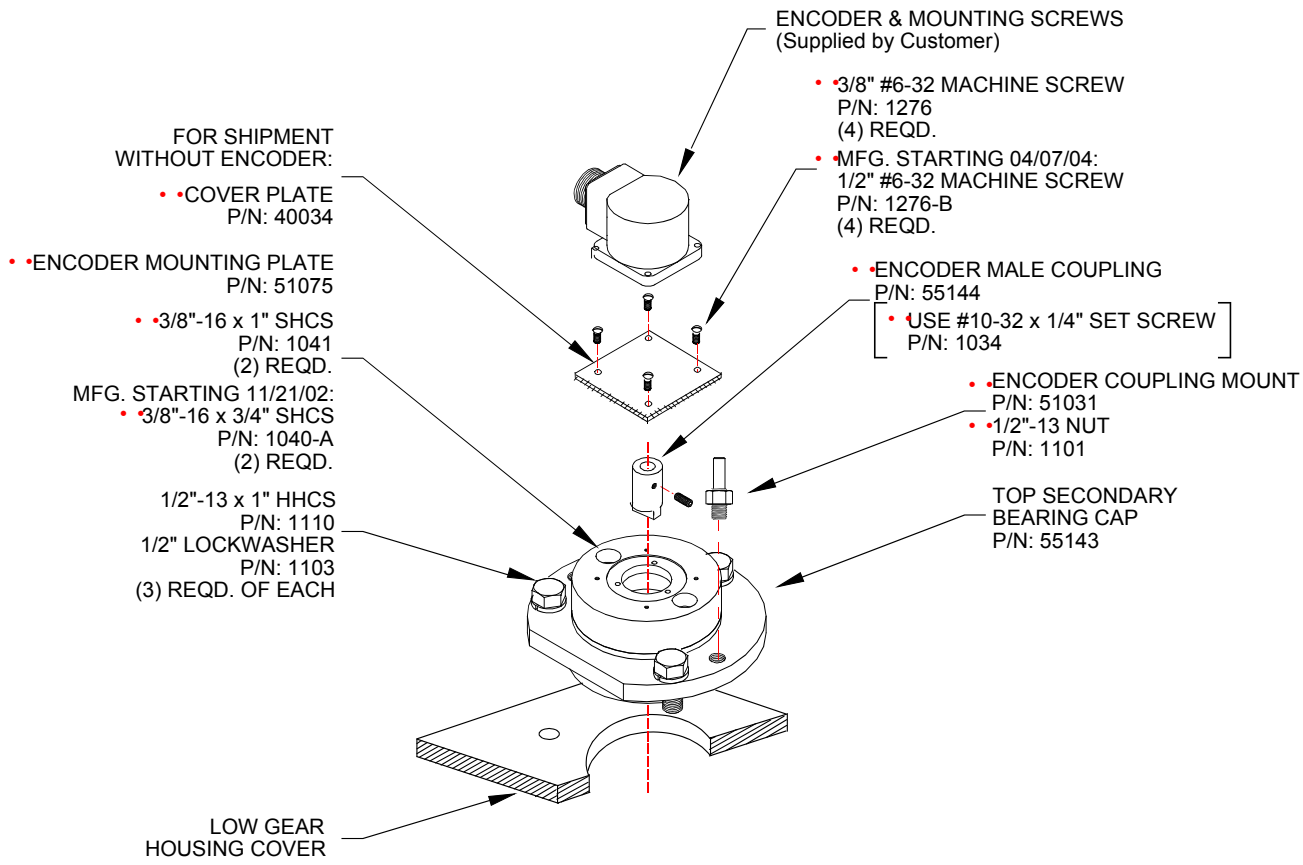

ENCODER ASSEMBLY

ENCODER ASSEMBLY NO. 55142 • •

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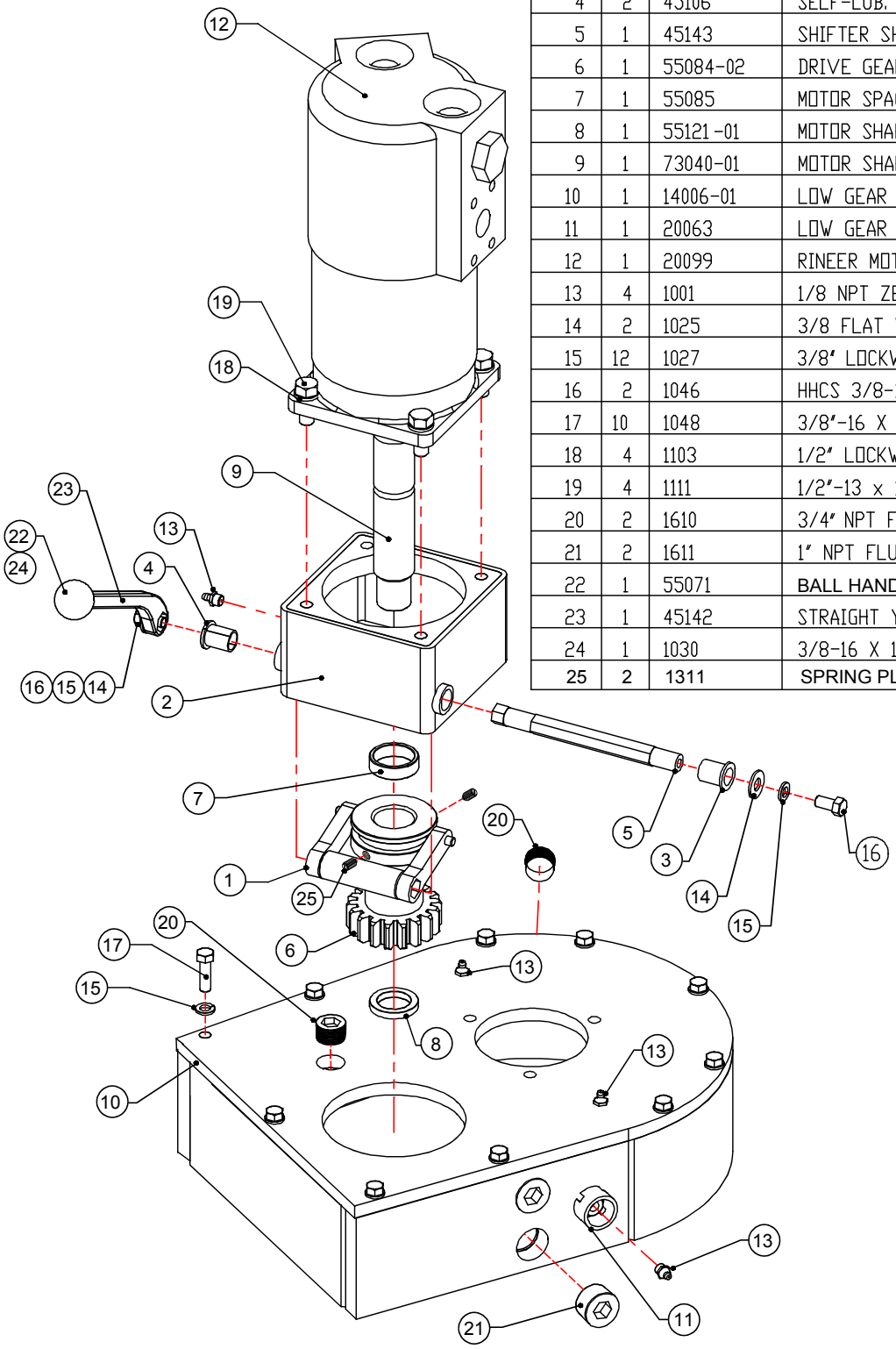
REV. #	LOG #	DATE
2		12/09/04

REF: S:\Equip Manuals-Dwgs\CLE5500\Encoder rev2.wpg

Item #	Qty.	Part Number	Part Name
1	1	45072	SHIFTING YOKE WELDMENT
2	1	55076	SHIFT BOX WELDMENT
3	1	45092	SELF-LUB. FLANGE BEARING
4	2	45106	SELF-LUB. FLANGE BEARING - MOD. SPLIT
5	1	45143	SHIFTER SHAFT
6	1	55084-02	DRIVE GEAR
7	1	55085	MOTOR SPACER
8	1	55121-01	MOTOR SHAFT BEARING SPACER
9	1	73040-01	MOTOR SHAFT
10	1	14006-01	LOW GEAR HOUSING COVER
11	1	20063	LOW GEAR HOUSING WELDMENT
12	1	20099	RINEER MOTOR
13	4	1001	1/8 NPT ZERT
14	2	1025	3/8 FLAT WASHER
15	12	1027	3/8" LOCKWASHER
16	2	1046	HHCS 3/8-16 X 3/4
17	10	1048	3/8"-16 X 1 1/4" HHCS
18	4	1103	1/2" LOCKWASHER
19	4	1111	1/2"-13 x 1 1/4" HHCS
20	2	1610	3/4" NPT FLUSH PLUG
21	2	1611	1" NPT FLUSH PLUG
22	1	55071	BALL HANDLE
23	1	45142	STRAIGHT YOKE HANDLE
24	1	1030	3/8-16 X 1" SET SCREW
25	2	1311	SPRING PLUNGER



MOTOR GEAR BOX ASSEMBLY

ASSEMBLY NO. 55188-02

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REV. #	LOG #	DATE
		08/31/05

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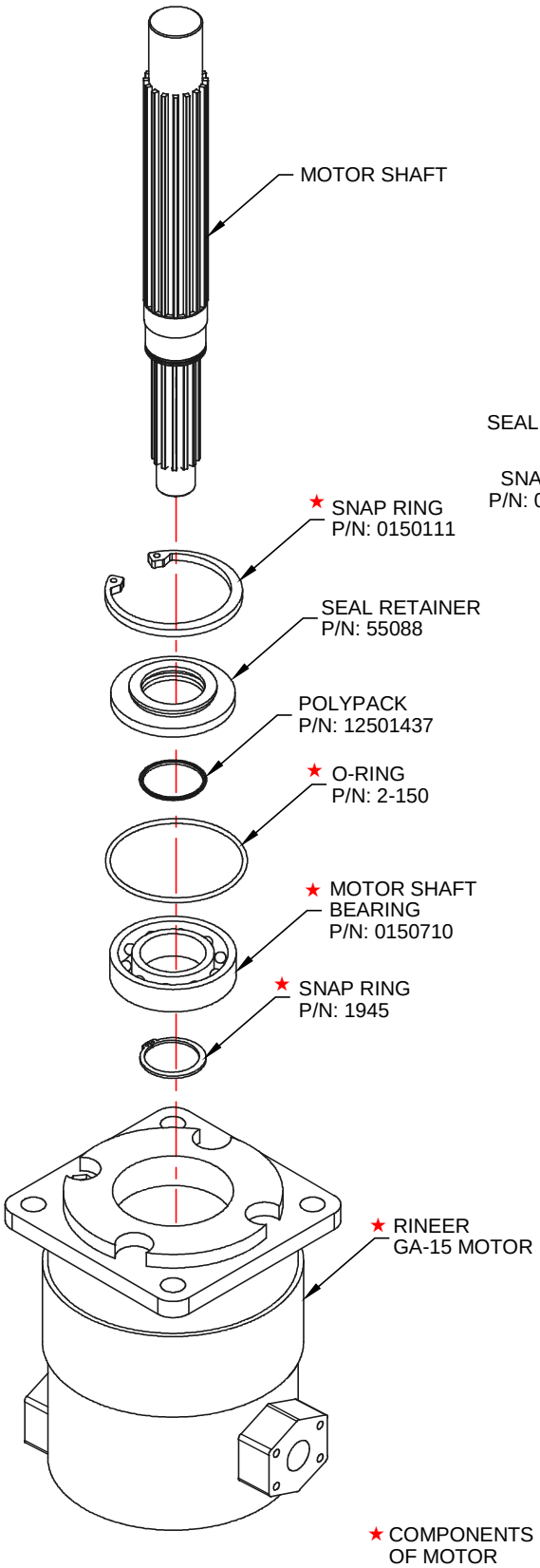

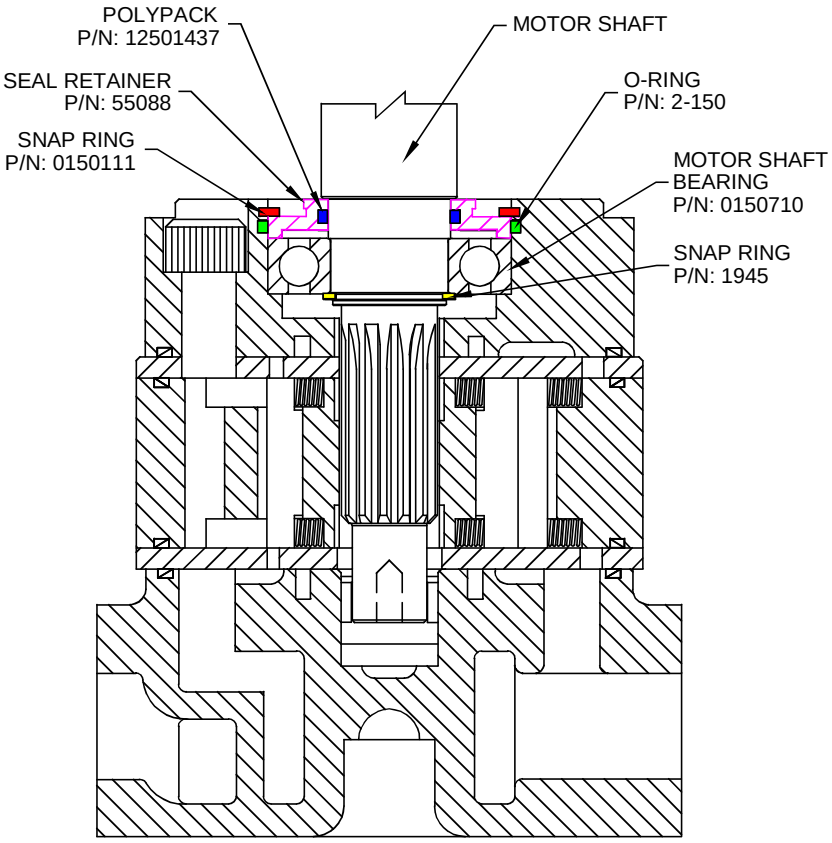

W/ OUT WIPER RING

FOR CLARITY PURPOSE ONLY
NOT TO SCALE

MOTOR ASSEMBLY

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
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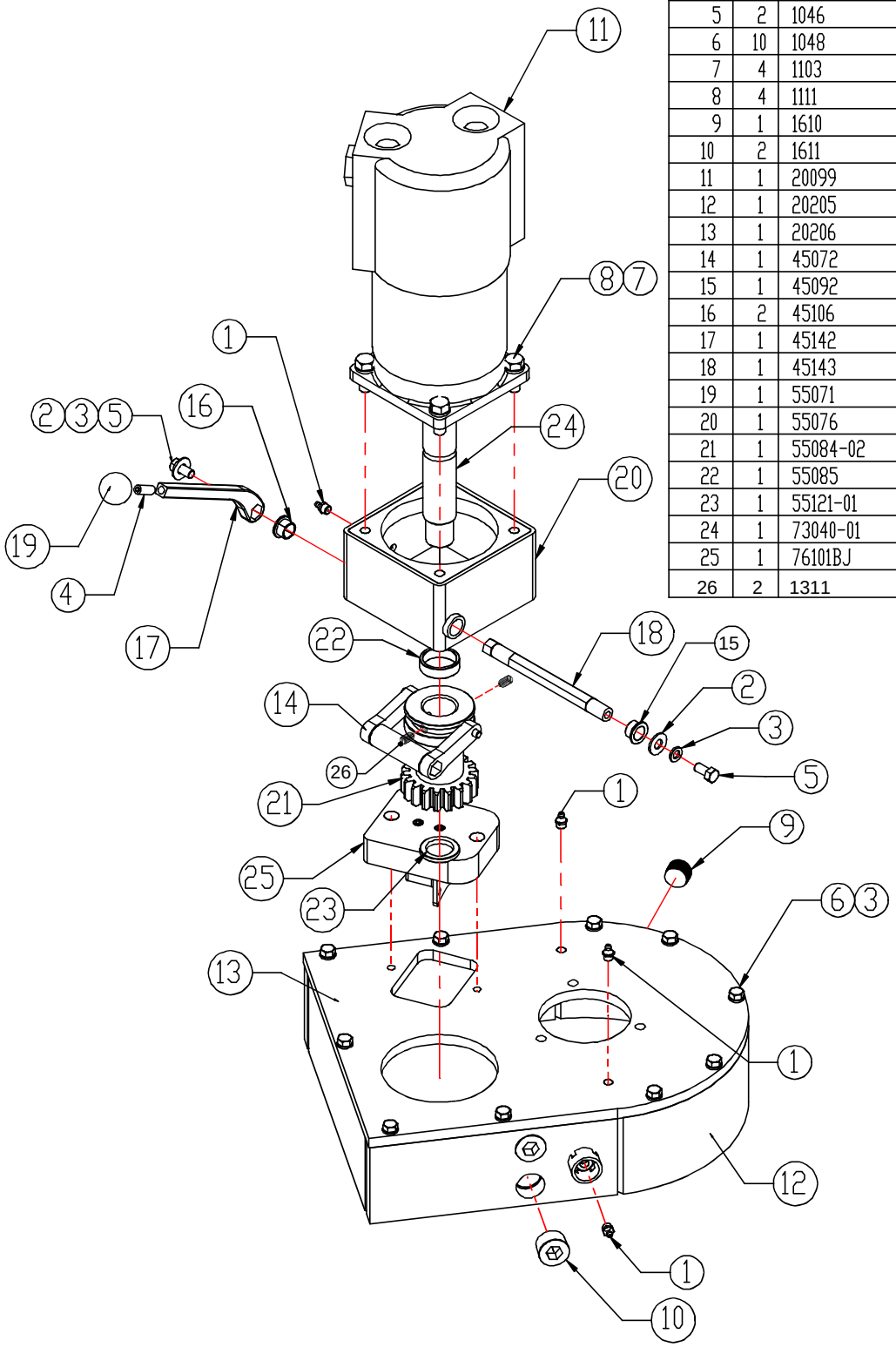
		10/04/06
REV. #	LOG #	DATE

REF: P:\Manuals\Equip Manuals\Dwgs\Motor\Motor CLE5500+.wpg

Item #	Qty.	Part Number	Part Name
1	4	1001	1/8 NPT ZERT
2	2	1025	3/8 FLAT WASHER
3	12	1027	WASHER, LOCK 3/8"
4	1	1030	3/8-16 X 1" SET SCREW
5	2	1046	HHCS 3/8-16 X 3/4
6	10	1048	3/8"-16 X 1 1/4" HHCS
7	4	1103	1/2" LOCKWASHER
8	4	1111	1/2"-13 x 1 1/4" HHCS
9	1	1610	3/4 NPT FLUSH PLUG
10	2	1611	1" NPT FLUSH PLUG
11	1	20099	RINEER MOTOR 2SP. 30 cu.inch
12	1	20205	LOW GEAR HOUSING WELDMENT
13	1	20206	GEAR HOUSING COVER
14	1	45072	SHIFTING YOKE WELDMENT
15	1	45092	SELF LUBR. FLANGE BEARING
16	2	45106	S. L. FLANGE BEARING-SPLIT
17	1	45142	STRAIGHT YOKE HANDLE
18	1	45143	SHIFTER SHAFT
19	1	55071	KNOB 3/8-16THD
20	1	55076	SHIFT BOX WELDMENT
21	1	55084-02	DRIVE GEAR
22	1	55085	MOTOR SPACER
23	1	55121-01	MOTOR SHAFT BEARING SPACER
24	1	73040-01	MOTOR SHAFT
25	1	76101BJ	TURNS ENCODER MOUNT ASSEMBLY
26	2	1311	SPRING PLUNGER



MOTOR GEAR BOX ASSEMBLY

ASSEMBLY NO. 20188

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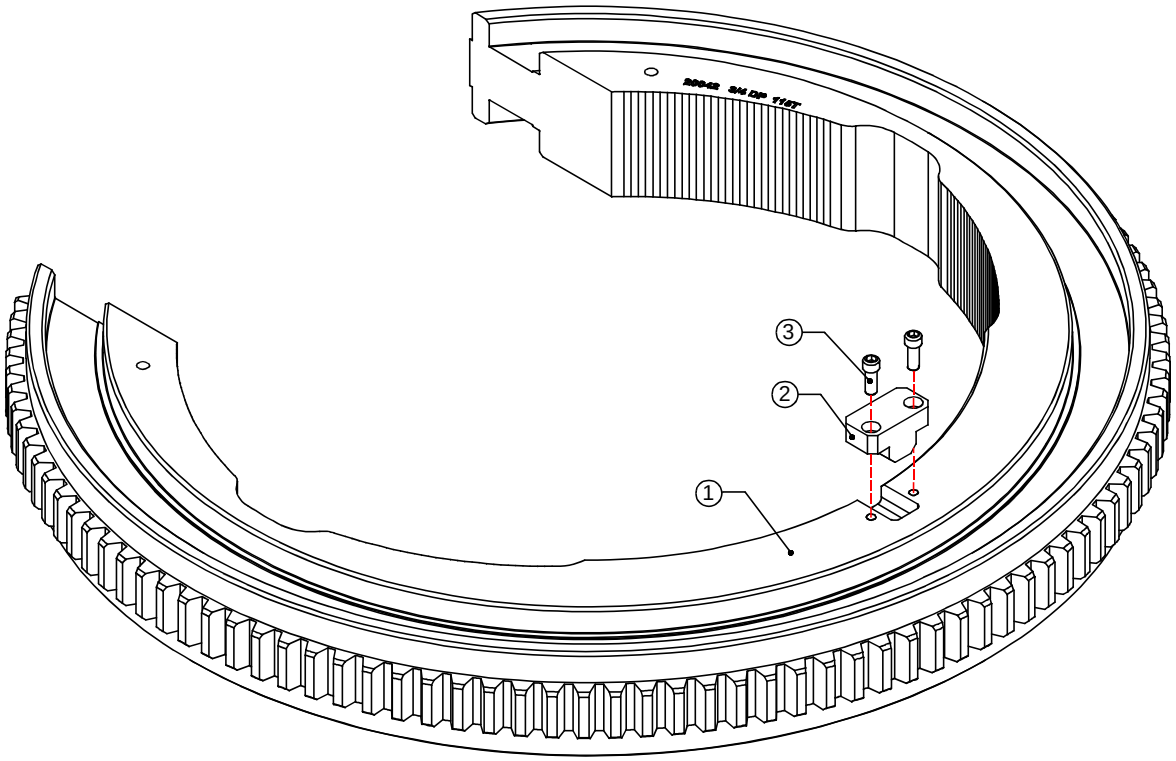
		02/13/07
REV. #	LOG #	DATE

REF: P:\Manuals\Equip Manuals\Dwgs\CLE20000XHT-03\20188.wpg

Item #	Qty.	Part Number	Part Name
1	1	20042	RING GEAR
2	1	20072	RING GEAR KEY
3	2	1041	3/8-16x1" SHCS



RING GEAR ASSEMBLY

ASSEMBLY NO. 20058

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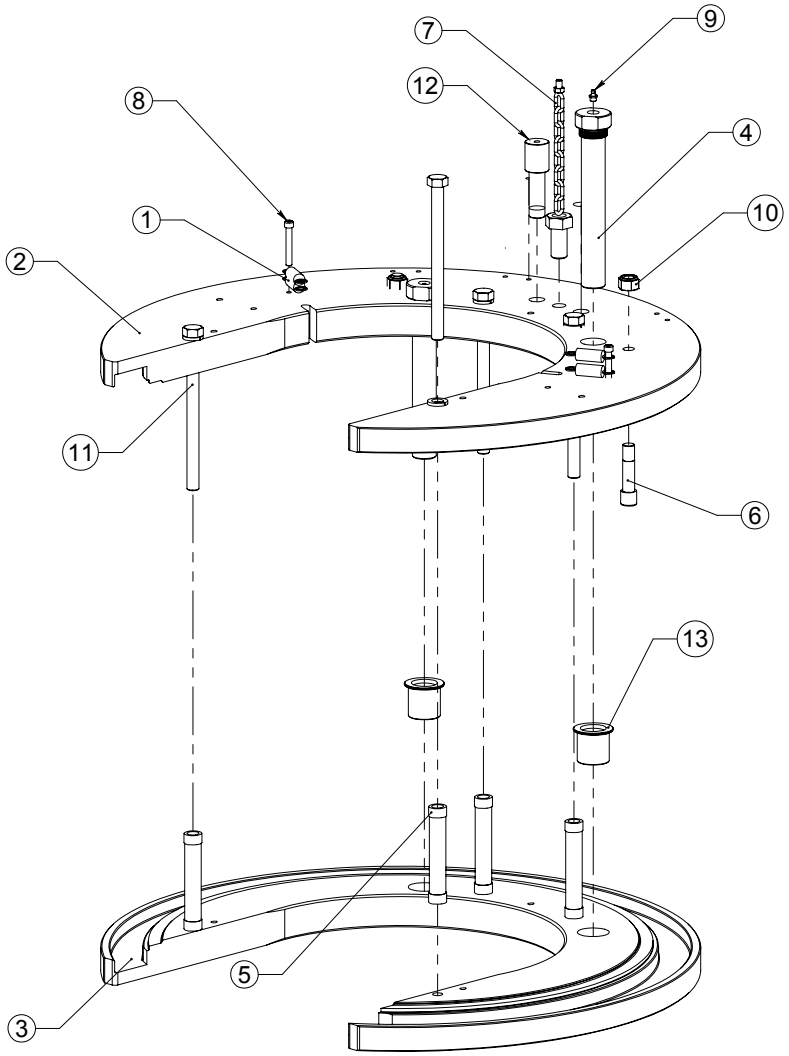
1		02/12/07
REV. #	LOG #	DATE

REF: P:\Manuals\Equip Manuals\Dwgs\CLE20000XHT-01\20058 rev1.wpg

Item #	Qty.	Part Number	Part Name
1	4	2038-01	SPRING .75 OD x 3 L x .093W x20 #/IN x 1.9 MAX. DEFL.
2	1	20019	TOP CAGE PLATE
3	1	20022	BOTTOM CAGE PLATE
4	2	20043	JAW PIVOT PIN
5	4	20066	CAGE PLATE SPACER
6	2	20069	RING GEAR STOP
7	1	26038	CAGE PLATE REVERSING PIN RETAINER
8	2	240	3/8-16 x 2 1/2 SHCS
9	2	1001	1/8 NPT ZERT
10	2	1167	3/4-10 NYLOCK HEX NUT
11	4	1266	3/4"-10 X 10" HHCS
12	1	2007-01	CAGE PLATE LOCKING PIN
13	2	20196	JAW PIVOT SPACER
14	4	1171	3/4" LOCKWASHER



APPROX.WEIGHT (lbs.) = 542.081

CAGE PLATE ASSEMBLY

ASSEMBLY NO. 20068-01

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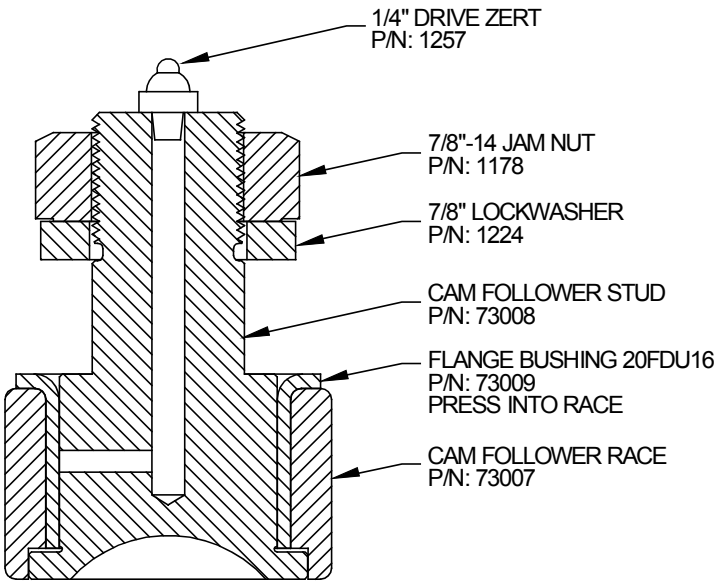
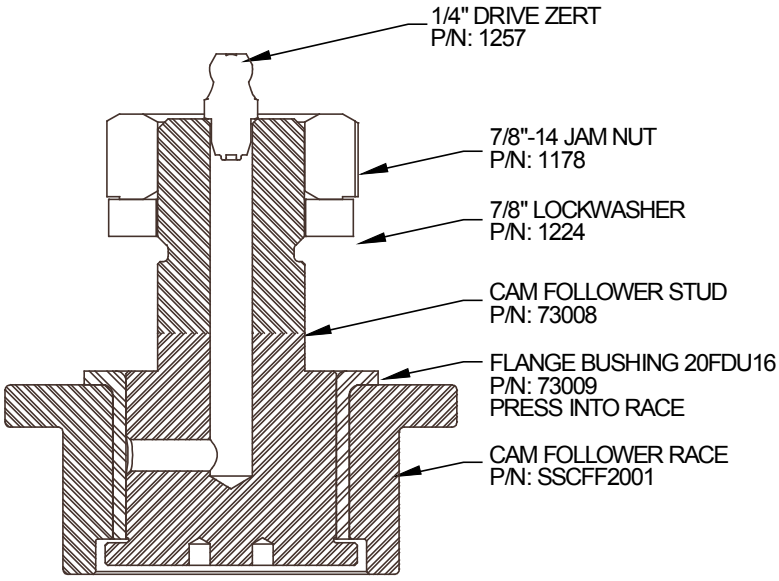
REV. #	LOG #	DATE
1		04/14/09



SECTION VIEW

1 7/8" ASSEMBLY

ASSEMBLY NO. SSCF1875



SECTION VIEW

2" ASSEMBLY

ASSEMBLY NUMBER SSCFF2000

SEVERE SERVICE CAM FOLLOWER ASSEMBLIES

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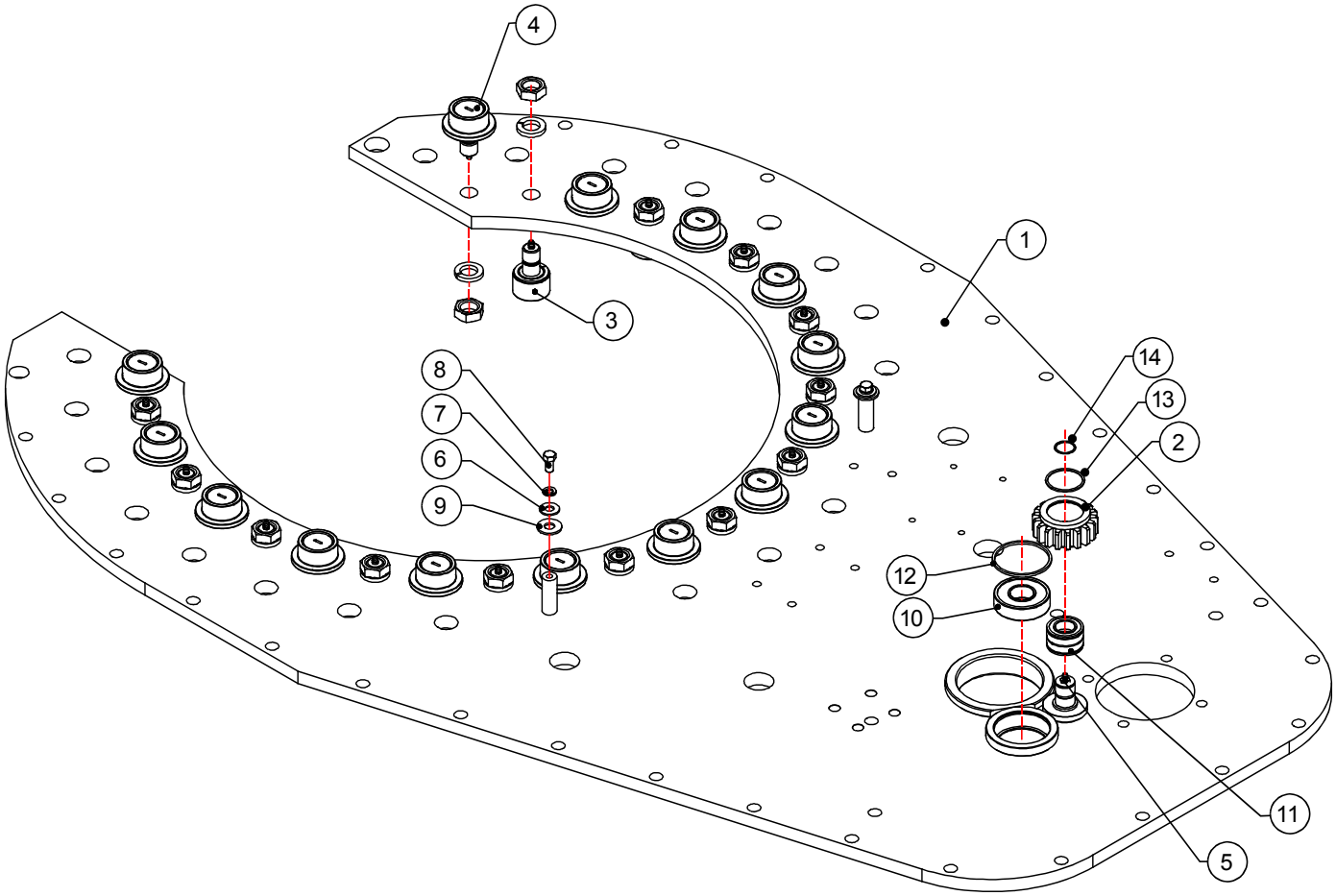
		08/23/05
REV. #	LOG #	DATE

REF: S:\Equip Manuals-Dwgs\CLE20000XHT-01\Cam Fol.wpg

Item #	Qty.	Part Number	Part Name
1	1	20021	TOP PLATE WELDMENT
2	1	55123-03	HIGH GEAR IDLER
3	13	SSCF1875	CAM FOLLOWER ASSEMBLY
4	14	SSCFF2000	2" FLANGED SEVERE SERVICE CAM FOLLOWER ASSEMBLY
5	1	1001	1/8 NPT ZERT
6	2	1025	3/8 FLAT WASHER
7	2	1027	WASHER, LOCK 3/8"
8	2	1046	HHCS 3/8-16 X 3/4
9	2	1102	1/2" FLAT WASHER
10	1	1901	BEARING (FOR MOTOR SHAFT)
11	1	1920	25mm ID X 47mm OD X 30mm W/ snap ring BEARING
12	1	1948	INT.SNAP RING -RRT283 (FOR MOTOR SHAFT)
13	1	1949	INT.SNAP RING -N5000-187
14	1	1950	EXT.SNAP RING -N5100-100



TOP PLATE ASSEMBLY

ASSEMBLY NO. 20054

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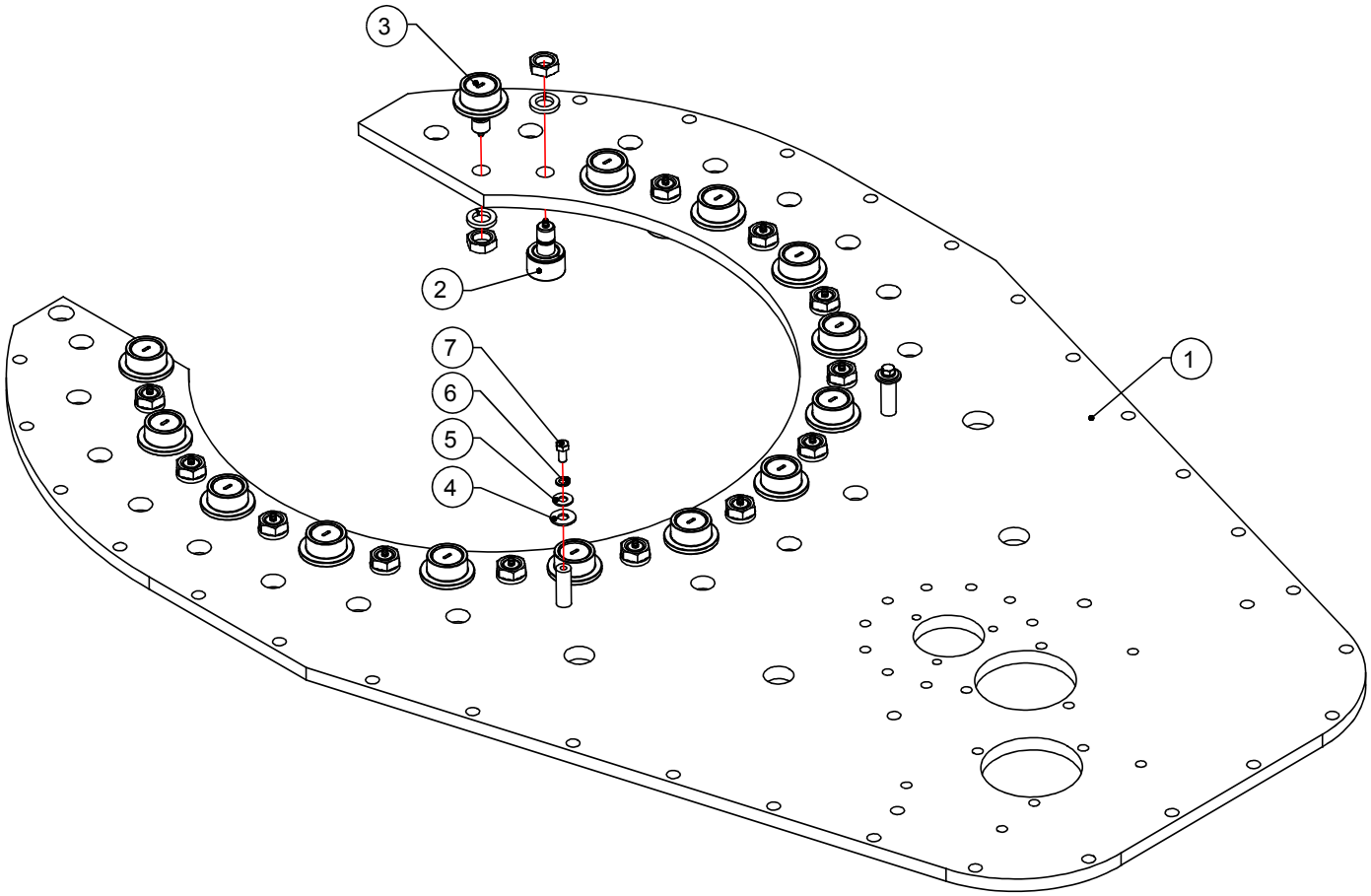
REV. #	LOG #	DATE
		08/23/05

REF: S:\Equip Manuals-Dwgs\CLE20000XHT-01\20054.wpg

Item #	Qty.	Part Number	Part Name
1	1	20052	BOTTOM PLATE WELDMENT
2	13	SSCF1875	CAM FOLLOWER ASSEMBLY
3	14	SSCFF2000	2" FLANGED SEVERE SERVICE CAM FOLLOWER ASSEMBLY
4	2	1102	1/2" FLAT WASHER
5	2	1025	3/8 FLAT WASHER
6	2	1027	WASHER, LOCK 3/8"
7	2	1046	HHCS 3/8-16 X 3/4



BOTTOM PLATE ASSEMBLY

ASSEMBLY NO. 20053

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		08/23/05
REV. #	LOG #	DATE

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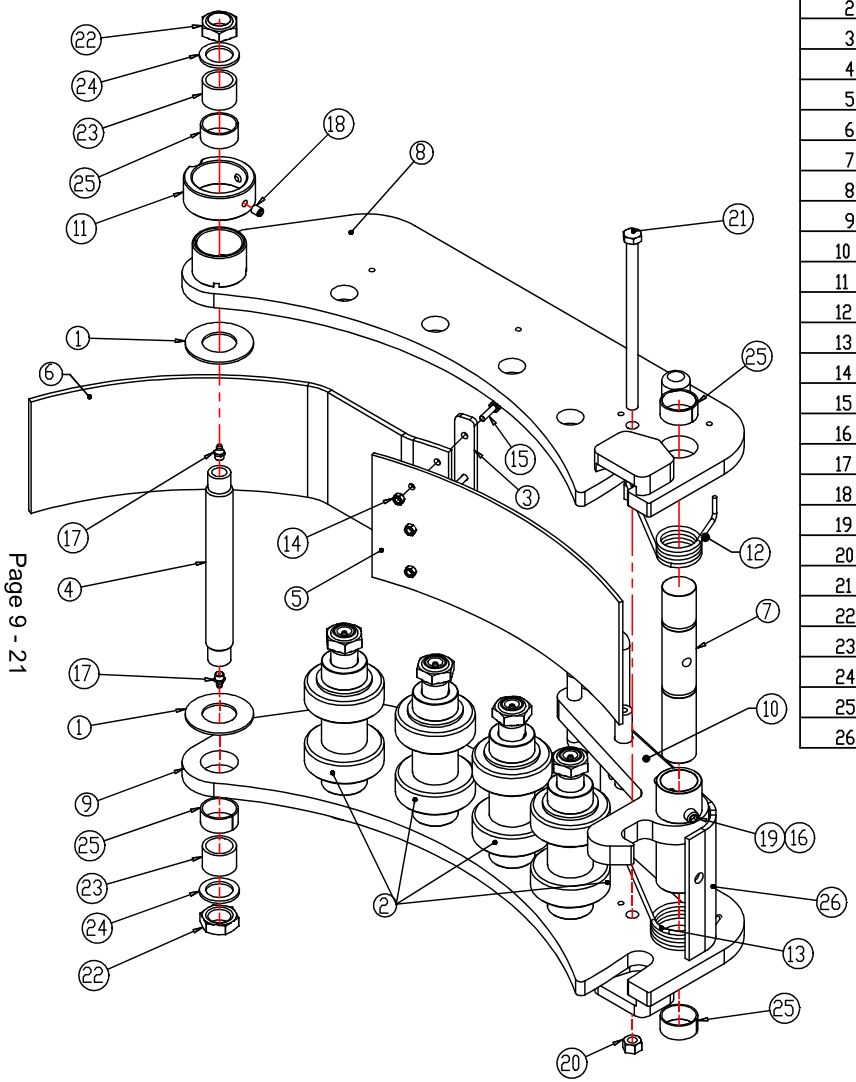
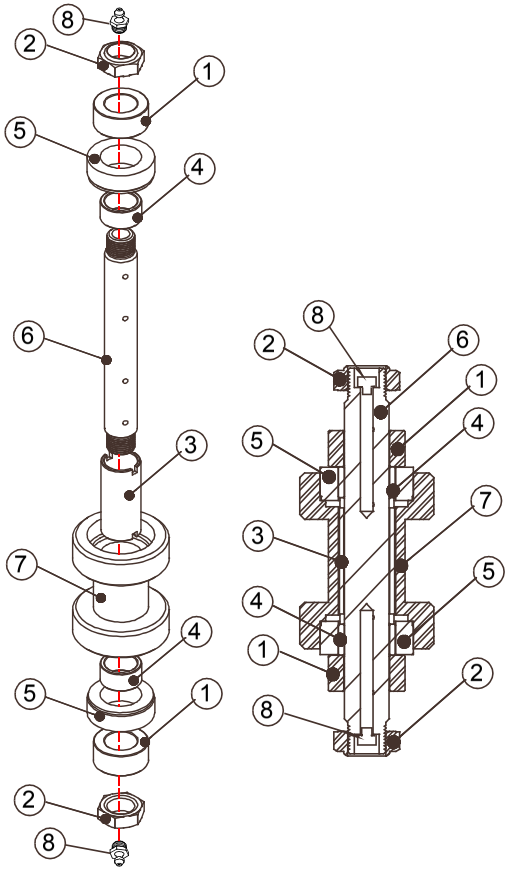
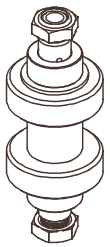


Item #	Qty.	Part Number	Part Name
1	2	14116	DOOR THRUST BUSHING
2	4	14148 • •	DUMBELL ROLLER ASSEMBLY
3	1	14151	SUPPORT STRIP
4	1	14120-01	DOOR SHAFT
5	1	20101-S1	ROLLER GUARD
6	1	20120	RUBBER GUARD
7	1	20122	DOOR LATCH PIVOT PIN
8	1	20123	TOP TONG DOOR PLATE WELDMENT
9	1	20124	BOTTOM TONG DOOR PLATE WELDMENT
10	1	20125	LATCH WELDMENT F/20" XHT
11	1	76131	DOOR SWITCH ADJ. SLEEVE
12	1	SMH1501-N	TORSION SPRING
13	1	SMH1501-O	TORSION SPRING
14	3	100	1/4"-20 HEX NUT GR8
15	3	105	1/4"-20 X 1" HHCS GR8
16	1	213	3/8-16 NYLOC NUT
17	2	1001	1/8 NPT ZERT
18	2	1029	3/8"-16 X 1/2" SET SCREW
19	1	1044	3/8-16 x 1 SHCS
20	1	1101	NUT, HEX, 1/2-13
21	1	1122	HHCS 1/2"-13 X 9" GR8
22	2	1213	1"-12 LOW PROFILE NYLOCK NUT
23	2	1954-A	INNER RACE
24	2	2040	DOOR BUSHING
25	4	2096	MODIFIED GARLOCK BUSHING
26	1	20127	RUBBER FLAP





DUMBELL ROLLER ASSEMBLY

ASSEMBLY NO. 14148 • •

Item	Qty.	Part Number	Description
1	2	14113-S2	DOOR DOUBLER
2	2	1213	1"-12 LP NYLOCK NUT
3	1	55027-D	DUMBELL ROLLER SPACER
4	2	55192	DUMBELL ROLLER SPACER
5	2	55191	DUMBELL ROLLER BUSHING
6	1	55022-A	SHAFT
7	1	14123	DOOR ROLLER
8	2	1001	1/8" NPT ZERT

LATCHING DOOR ASSEMBLY

ASSEMBLY NO. 20106

(FOR TONGS MANUFACTURED BEFORE 10/2009)

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		08/24/05
REV. #	LOG #	DATE

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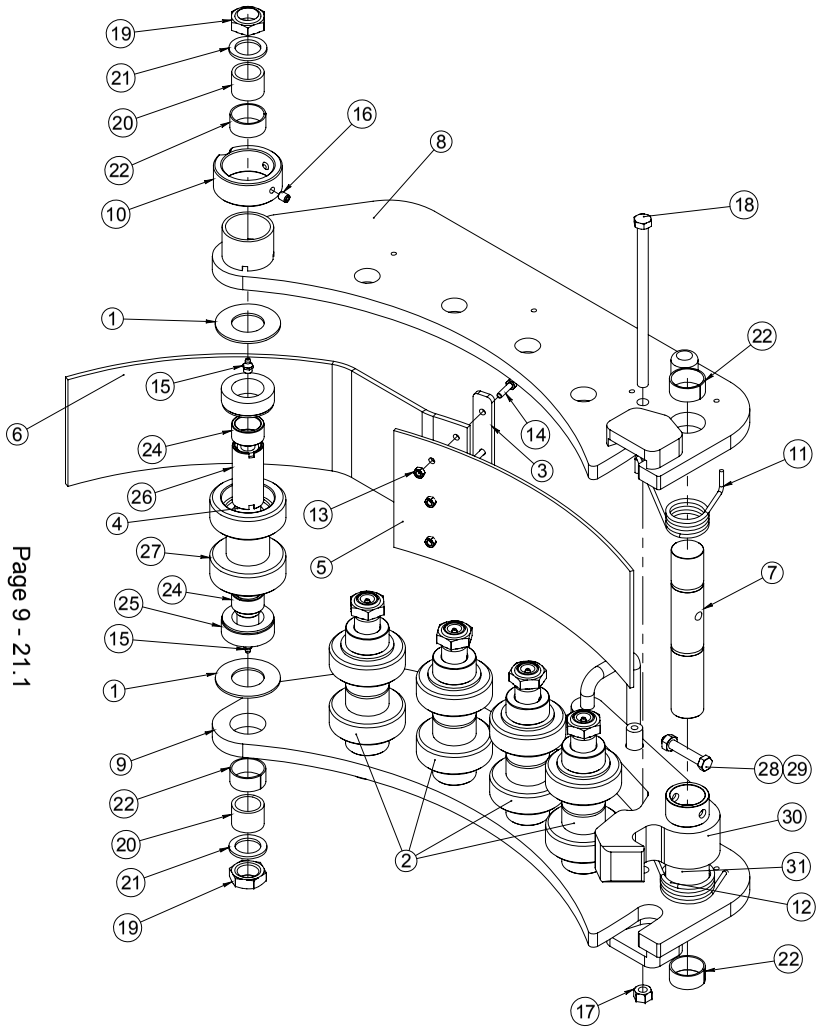
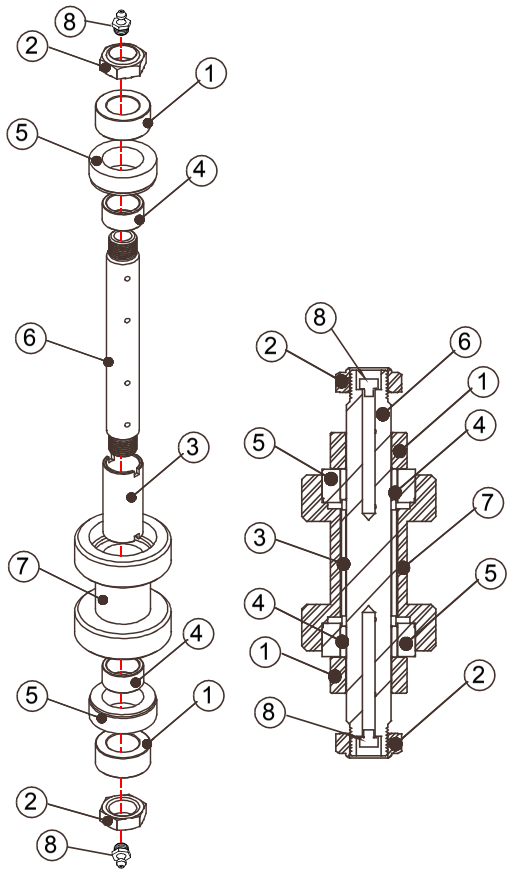
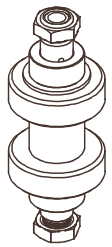


Item #	Qty.	Part Number	Part Name
1	2	14116	DOOR THRUST BUSHING
2	4	14148	DUMBELL ROLLER ASSEMBLY
3	1	14151	SUPPORT STRIP
4	1	14120-01	DOOR SHAFT
5	1	20101-S1	ROLLER GUARD
6	1	20120	RUBBER GUARD
7	1	20122-01	DOOR LATCH PIVOT PIN
8	1	20123	TOP TONG DOOR PLATE WELDMENT
9	1	20124	BOTTOM TONG DOOR PLATE WELDMENT
10	1	76131	DOOR SWITCH ADJ. SLEEVE
11	1	SMH1501-N	TORSION SPRING
12	1	SMH1501-O	TORSION SPRING
13	3	100	1/4"-20 HEX NUT GR8
14	3	105	1/4"-20 X 1" HHCS GR8
15	2	1001	1/8 NPT ZERT
16	2	1029	3/8"-16 X 1/2" SET SCREW
17	1	1101	NUT, HEX, 1/2-13
18	1	1122	HHCS 1/2"-13 X 9" GR8
19	2	1213	1"-12 LOW PROFILE NYLOCK NUT
20	2	1954-A	INNER RACE
21	2	2040	DOOR BUSHING
22	4	2096	MODIFIED GARLOCK BUSHING
23	1	20127	RUBBER FLAP
24	2	55192	DUMBELL ROLLER SPACER
25	2	55191	DUMBELL ROLLER BUSHING
26	1	55027-D	DUMBELL ROLLER SPACER
27	1	55025-B	DUMBELL ROLLER
28	1	160	HHCS 7/16-14 x 2 1/2"
29	1	292	7/16"-14 NYLOCK NUT
30	1	20125-01	LATCH WELDMENT F/20" XHT
31	1	20212	DOOR LATCH BOTTOM SPACER





DUMBELL ROLLER ASSEMBLY

ASSEMBLY NO. 14148 • •

Item	Qty.	Part Number	Description
1	2	14113-S2	DOOR DOUBLER
2	2	1213	1"-12 LP NYLOCK NUT
3	1	55027-D	DUMBELL ROLLER SPACER
4	2	55192	DUMBELL ROLLER SPACER
5	2	55191	DUMBELL ROLLER BUSHING
6	1	55022-A	SHAFT
7	1	14123	DOOR ROLLER
8	2	1001	1/8" NPT ZERT

LATCHING DOOR ASSEMBLY

ASSEMBLY NO. 20106

(FOR TONGS MANUFACTURED AFTER 10/2009)

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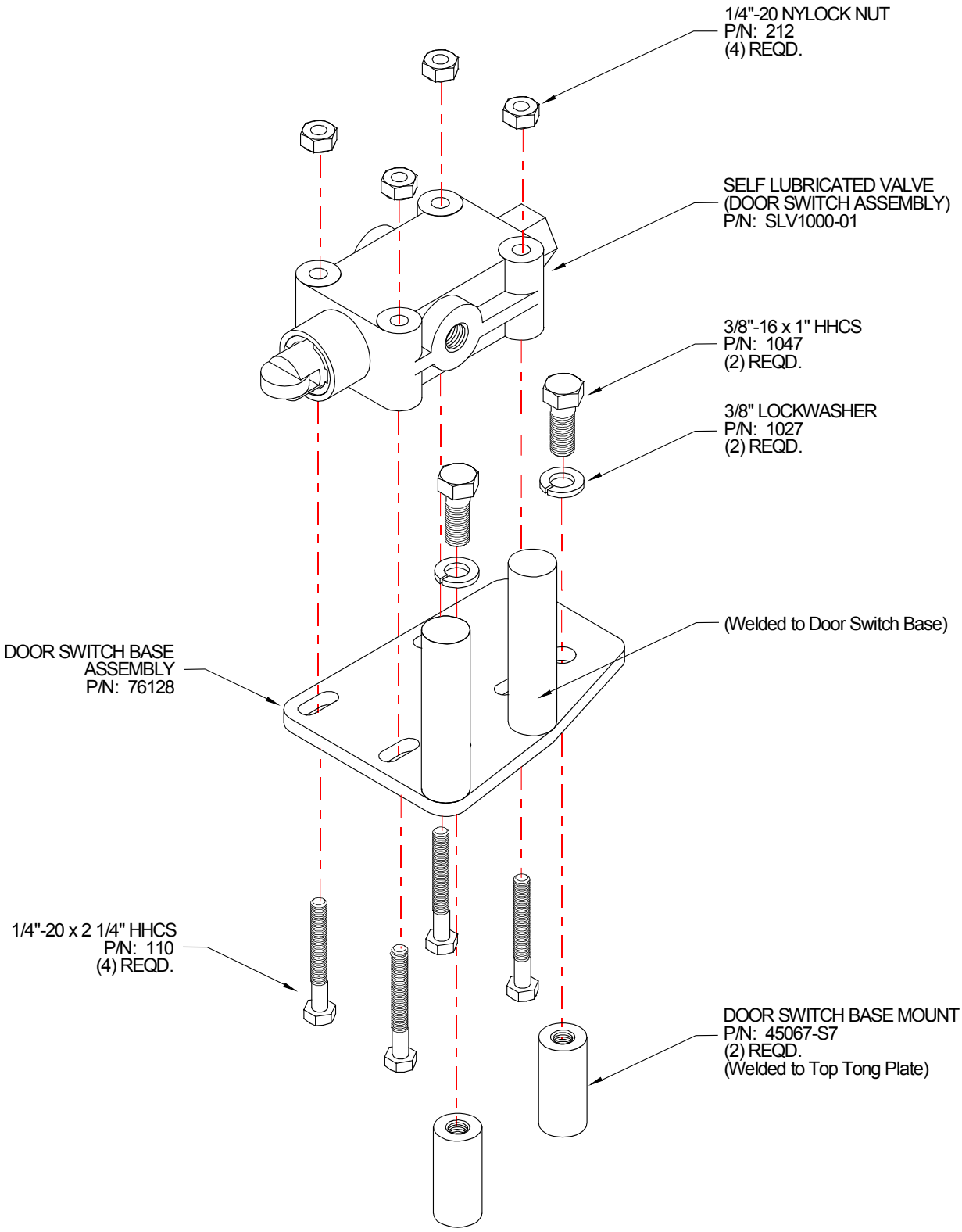
		10/15/09
REV. #	LOG #	DATE



DOOR SWITCH ASSEMBLY

ASSEMBLY NO. 26681

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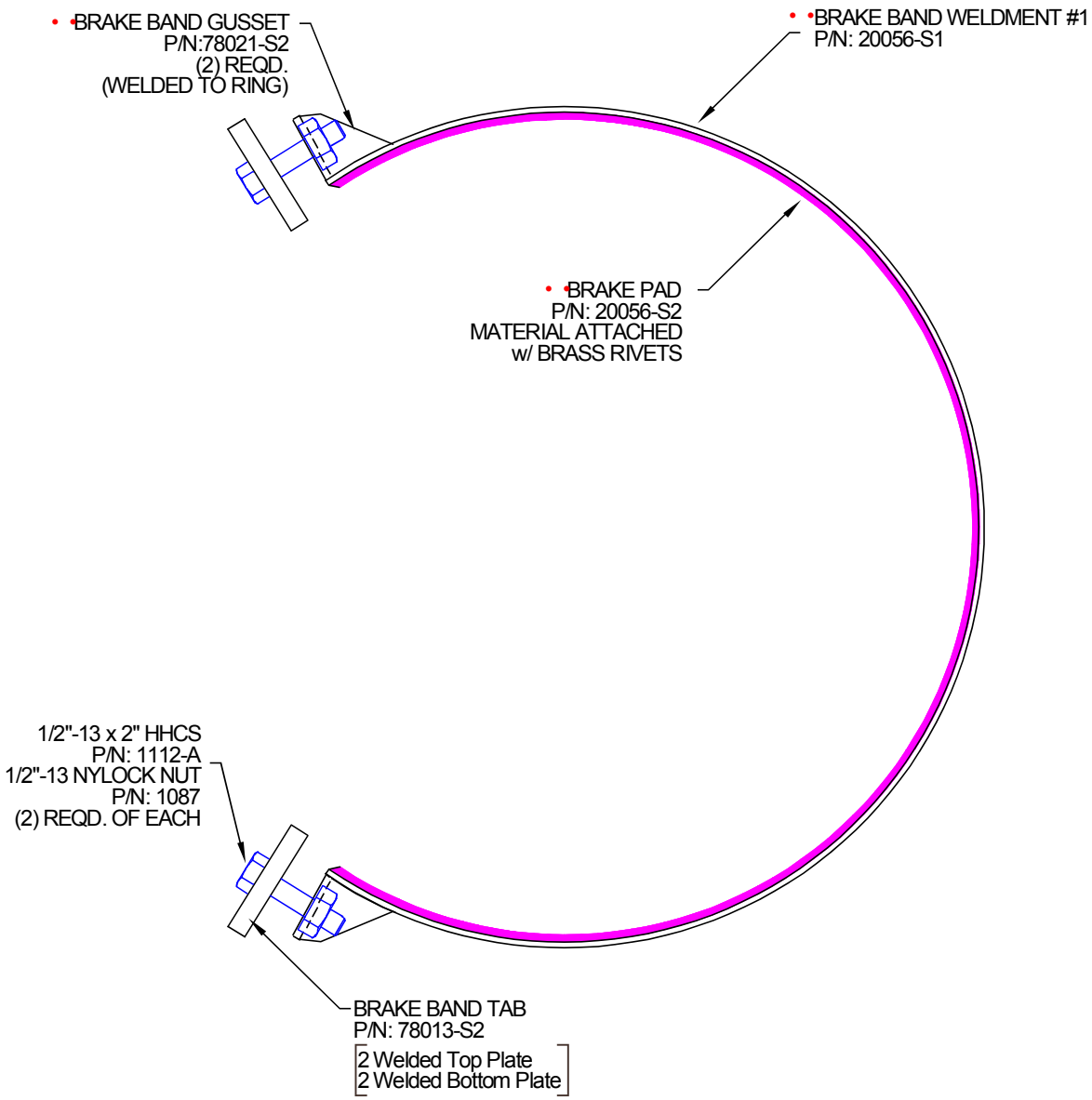
REV. #	LOG #	DATE
1		10/11/04

REF: S:\Equip Manuals-Dwgs\Door Switch Assy rev1.wpg



BRAKE BAND ASSEMBLY

BRAKE BAND WELDMENT NO. 20056 • •

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		11/11/04
REV. #	LOG #	DATE

REF: S:\Equip Manuals\Dwgs\CLE2000-07\Brake Band.wpg

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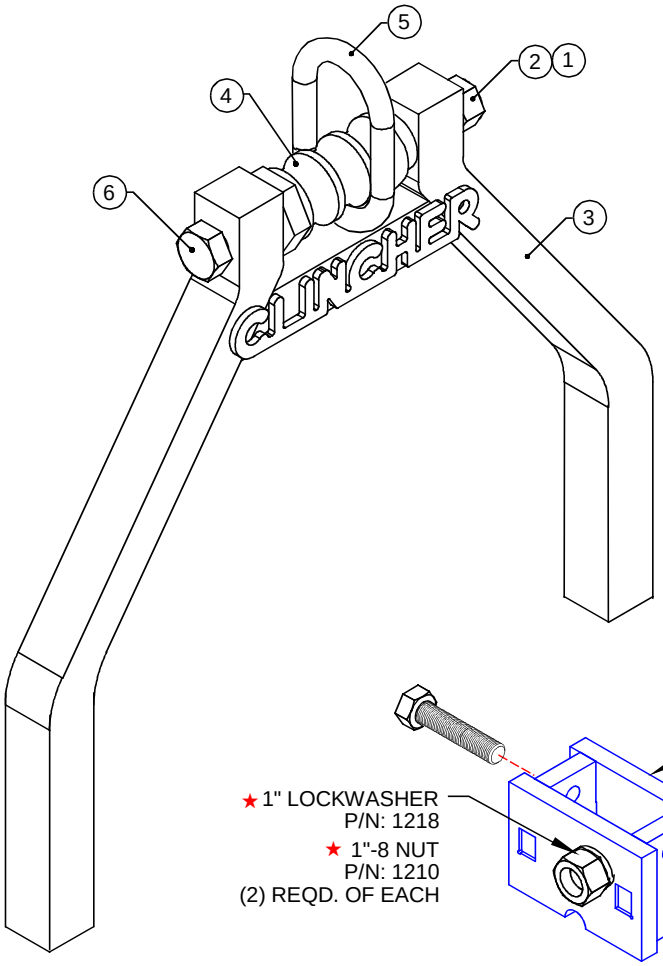
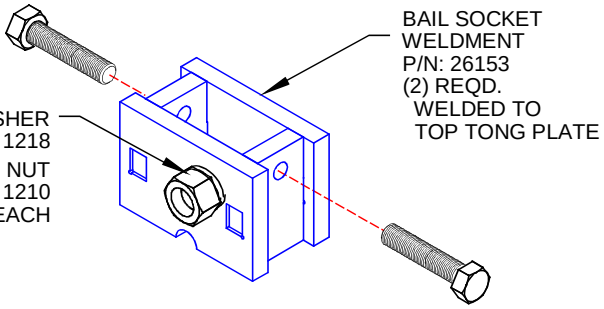
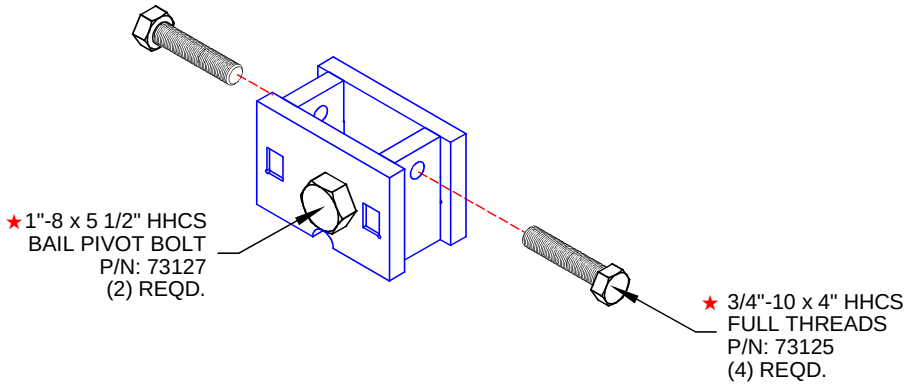
Item #	Qty.	Part Number	Part Name
1	1	1210	1"-8 NC HEX NUT
2	1	1218	1" LOCKWASHER
3	1	26727	BAIL WELDMENT
4	1	73117	BAIL ADJUSTMENT ROLLER
5	1	73118	1" x 2 TON MASTER LINK
6	1	73126	1"-8 x 12" HHCS GR.8







★ COMPONENTS OF TONG ASSEMBLY

BAIL ASSEMBLY

ASSEMBLY NUMBER 26728

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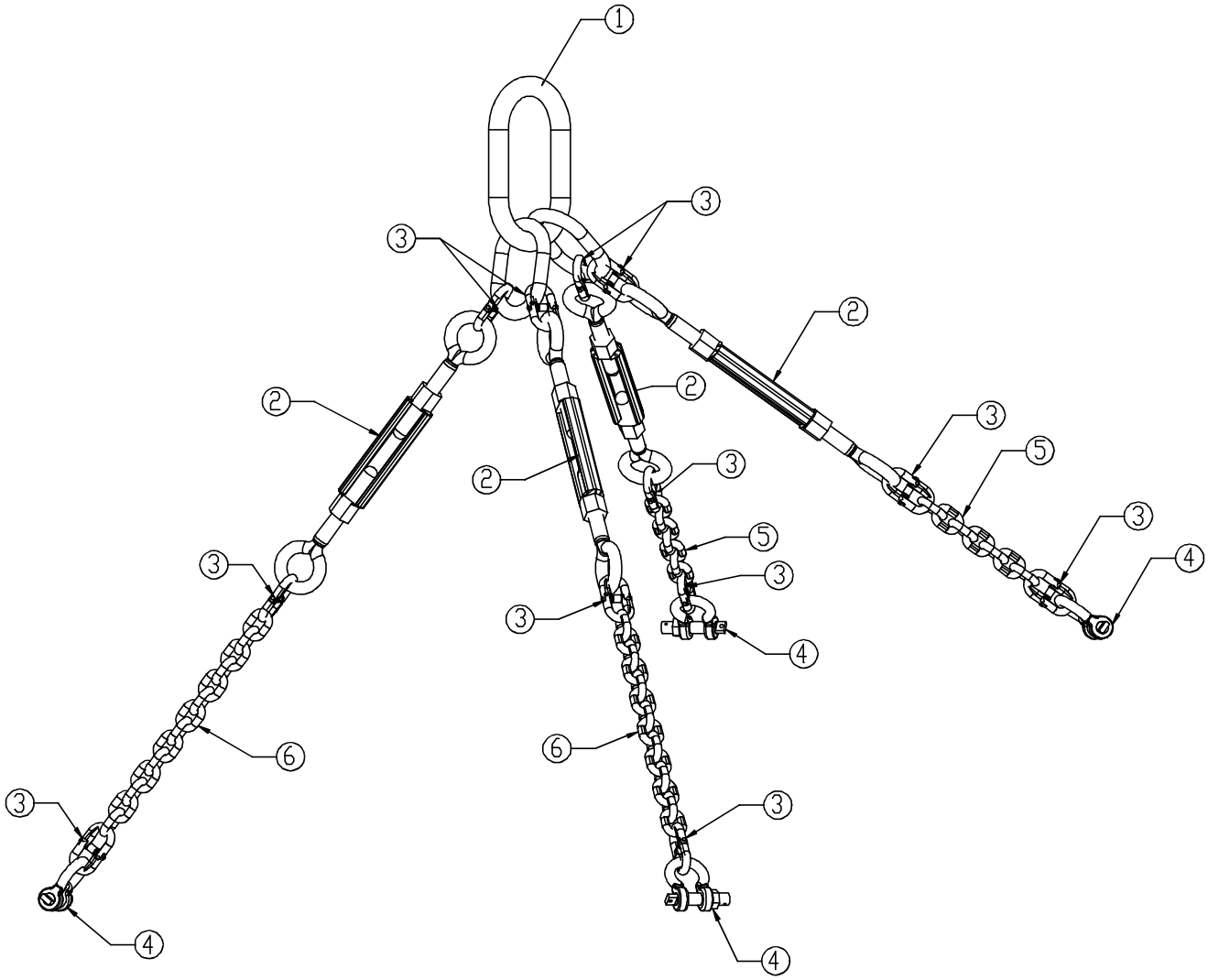
		01/08/07
REV. #	LOG #	DATE

REF: P:\Manuals\Equip Manuals\Dwgs\CLE22000XHT-04\26728 Bail.wpg

Item #	Qty.	Part Number	Part Name
1	1	45103-C	MASTER LINK ASSEMBLY
2	4	55001-02	3/4" X 6" EYE & EYE TURNBUCKLE
3	12	40027-S3	5/16" CONNECTING LINK
4	4	40027-S4A	1/2" 2 TON SCREW PIN SHACKLE
5	2	-----	3/8 CHAIN 6 LINKS
6	2	-----	3/8 CHAIN 9 LINKS



BRIDLE ASSEMBLY

ASSEMBLY NUMBER 20150

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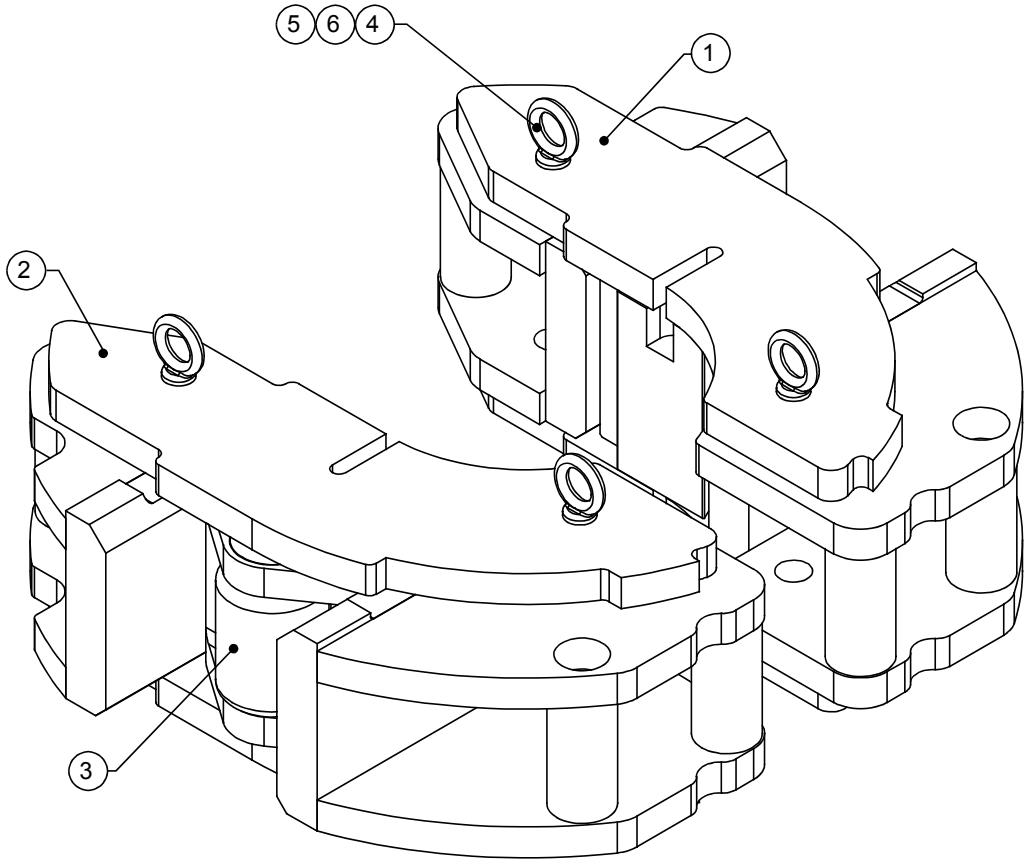
		02/12/07
REV. #	LOG #	DATE

REF: P:\Manuals\Equip Manuals\Dwgs\CLE20000XHT-03\20150 Bridle.wpg

Item #	Qty.	Part Number	Description
1	1	20110	LEFT COMBO JAW ADAPTER
2	1	20112	RIGHT COMBO JAW ADAPTER
3	2	20115	COMBO JAW PUSHER ASSEMBLY
4	4	BUCT7631	1/2 x 1 1/2 FORGED EYE BOLT
5	4	1101	1/2"-13 HEX NUT
6	4	1103	1/2" LOCKWASHER

NOTE: USES (2) JAW SPRINGS - P/N BUCM4004-S7
INCLUDED WITH ASSEMBLY



20" COMBO JAW ADAPTOR ASSEMBLY

ASSEMBLY NO. 20111

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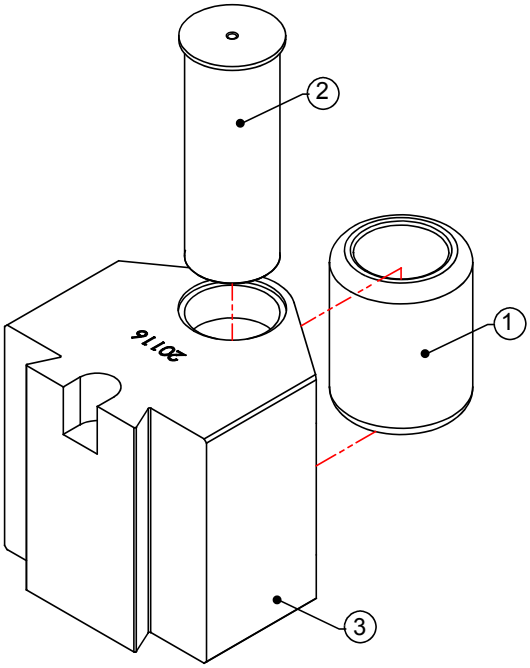
		08/24/05
REV. #	LOG #	DATE

REF: S:\Equip Manuals\Dwgs\CLE20000XHT-01\20111.wpg

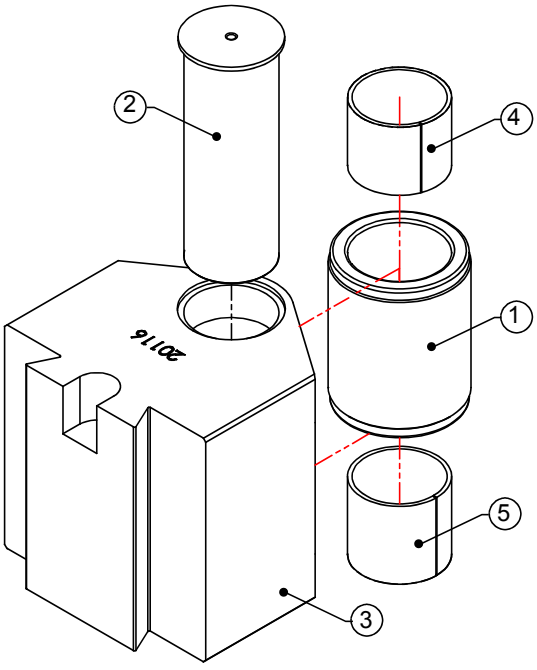
Item #	Qty.	Part Number	Description
1	1	73012-01	JAW ROLLER
2	1	73013-01	JAW PIN
3	1	20116	20" COMBO TONG JAW PUSHER



COMBO JAW PUSHER ASSEMBLY

ASSEMBLY NO. 20115

Item #	Qty.	Part Number	Description
1	1	73012-02	LOW FRICTION JAW ROLLER
2	1	73013-01	JAW PIN
3	1	20116	20" COMBO TONG JAW PUSHER
4	1	32DU28	2" x 1 3/4" DU BEARING
5	1	32DU32	2" x 2" DU BEARING



LOW FRICTION COMBO JAW PUSHER ASSEMBLY

ASSEMBLY NO. 20115-LF

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REV. #	LOG #	DATE

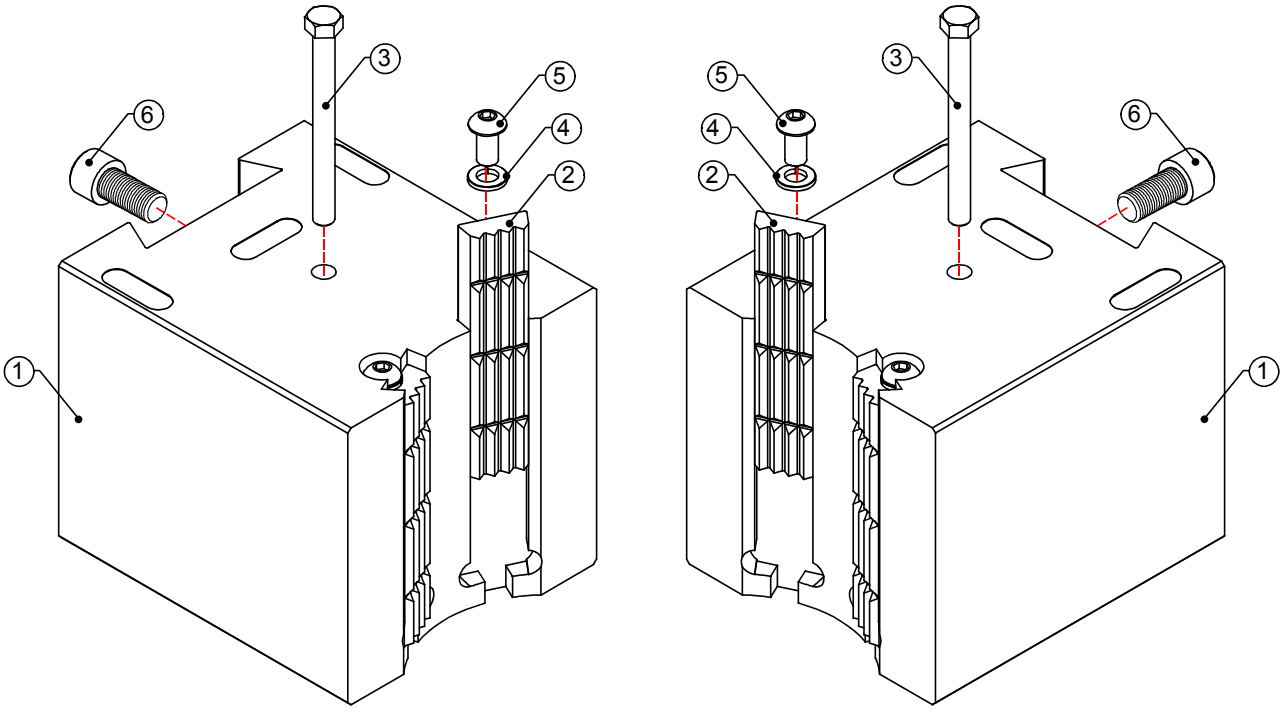
REF: S:\Equip Manuals\Dwgs\CLE20000XHT-01\20115 & LF.wpg

Item #	Qty.	Part Number	Description
1	2	SEE CHART	DOVETAIL TONG JAW
2	4	DTI1602	1/2" T x 1 1/4" W x 5" L STRIP DIE INSERT
3	2	148	3/8"-16 x 4" HHCS
4	4	1027	3/8" LOCKWASHER
5	4	1061	3/8"-16 x 3/4" BUTTON HEAD CAP SCREW
6	2	1153	5/8"-11 x 1" SHCS

STANDARD AVAILABLE JAW SIZES

Size	*Jaw Set Assembly Number*	*Jaw Part Number*	*Approx. Weight*
5"	20117-05000A	20117-05000	TBA
5 1/2"	20117-05500A	TBA	TBA
6 5/8"	20117-06625A	20117-06625	90.7
7"	20117-07000A	20117-07000	99.5
7 5/8"	20117-07625A	20117-07625	90.7
8 1/2"	20117-08500A	20117-08500	83.5
8 5/8"	20117-08625A	20117-08625	80.5

Other sizes available on request.
Order by P/N 20117-XXXXXA
Example: 6.770 = P/N 20117-06770A



20" COMBO JAW ASSEMBLY

ASSEMBLY NO. 20117-XXXXXA

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REF: S:\Equip Manuals\Dwgs\CLE20000XHT-01\20117.wpg

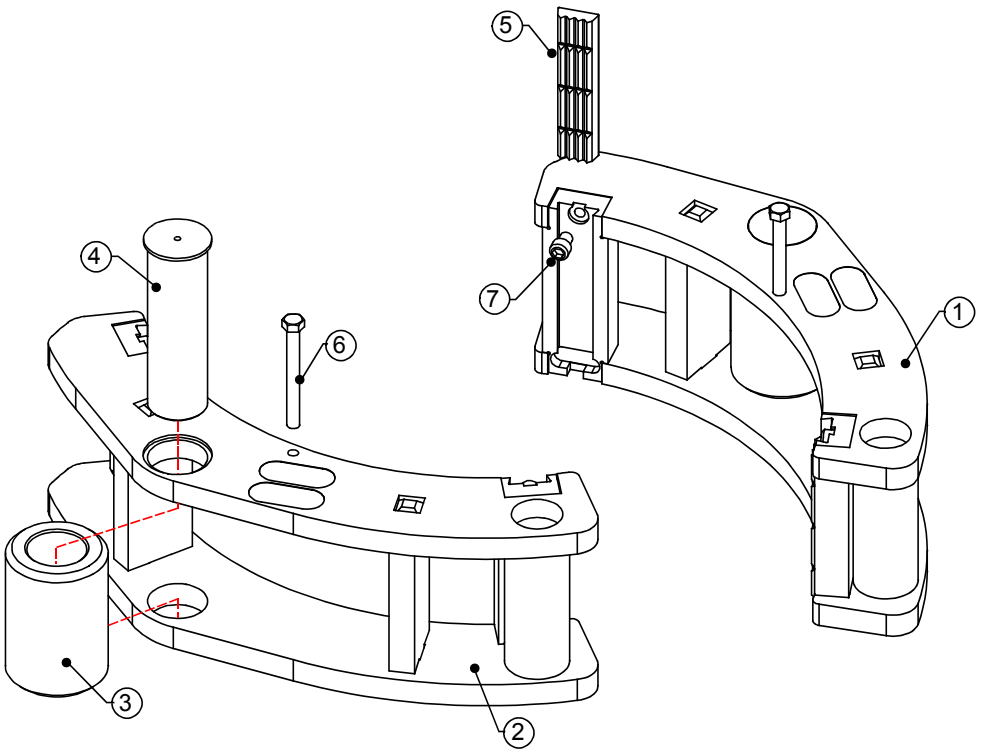
Item #	Qty.	Part Number	Description
1	1	SEE CHART	LEFT DOVETAIL JAW WELDMENT
2	1	SEE CHART	RIGHT DOVETAIL JAW WELDMENT
3	2	20070	JAW ROLLER
4	2	20071	JAW PIN
5	4	DTI1602	1/2" T x 1 1/4" W x 5" L STRIP DIE INSERT
6	2	1071	3/8"-16 x 3 1/2" HHCS
7	4	234	3/8"-16 x 1/2" SHCS

NOTE: USES (2) JAW SPRING P/N 2038

STANDARD AVAILABLE JAW SIZES

Size	*Jaw Set Assembly Number*	*Left Jaw Weldment Part Number*	*Right Jaw Weldment Part Number*	*Approx. Weight*
7 5/8"	CJDT20H07625	20H07625L	20H07625R	167.8
8 5/8"	CJDT20H08625	TBA	TBA	TBA
9 5/8"	CJDT20H09625	TBA	TBA	TBA
9 7/8"	CJDT20H09875	20H09875L	20H09875R	153.1
10 3/4"	CJDT20H10750	20H10750L	20H10750R	149.8
11 3/4"	CJDT20H11750	TBA	TBA	TBA
11 7/8"	CJDT20H11875	20H11875L	20H11875R	145.2
13 3/8"	CJDT20H13375	TBA	TBA	TBA
14"	CJDT20H14000	20H14000L	20H14000R	135.3
16"	CJDT20H16000	20H16000L	20H16000R	120.7
18 5/8"	CJDT20H18625	20H18625L	20H18625R	97.9
20"	CJDT20H20000	20H20000L	20H20000R	88.3

Other sizes available on request.
Order by P/N CJDT20HXXXXX
Example: 9.770 = P/N CJDT20H09770



20HT DOVETAIL JAW SET ASSEMBLY

SEE CHART FOR ASSEMBLY NUMBERS

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REV. #	LOG #	DATE

REF: S:\Equip Manuals\Dwgs\CLE20000XHT-01\CJDT20H Jaws.wpg

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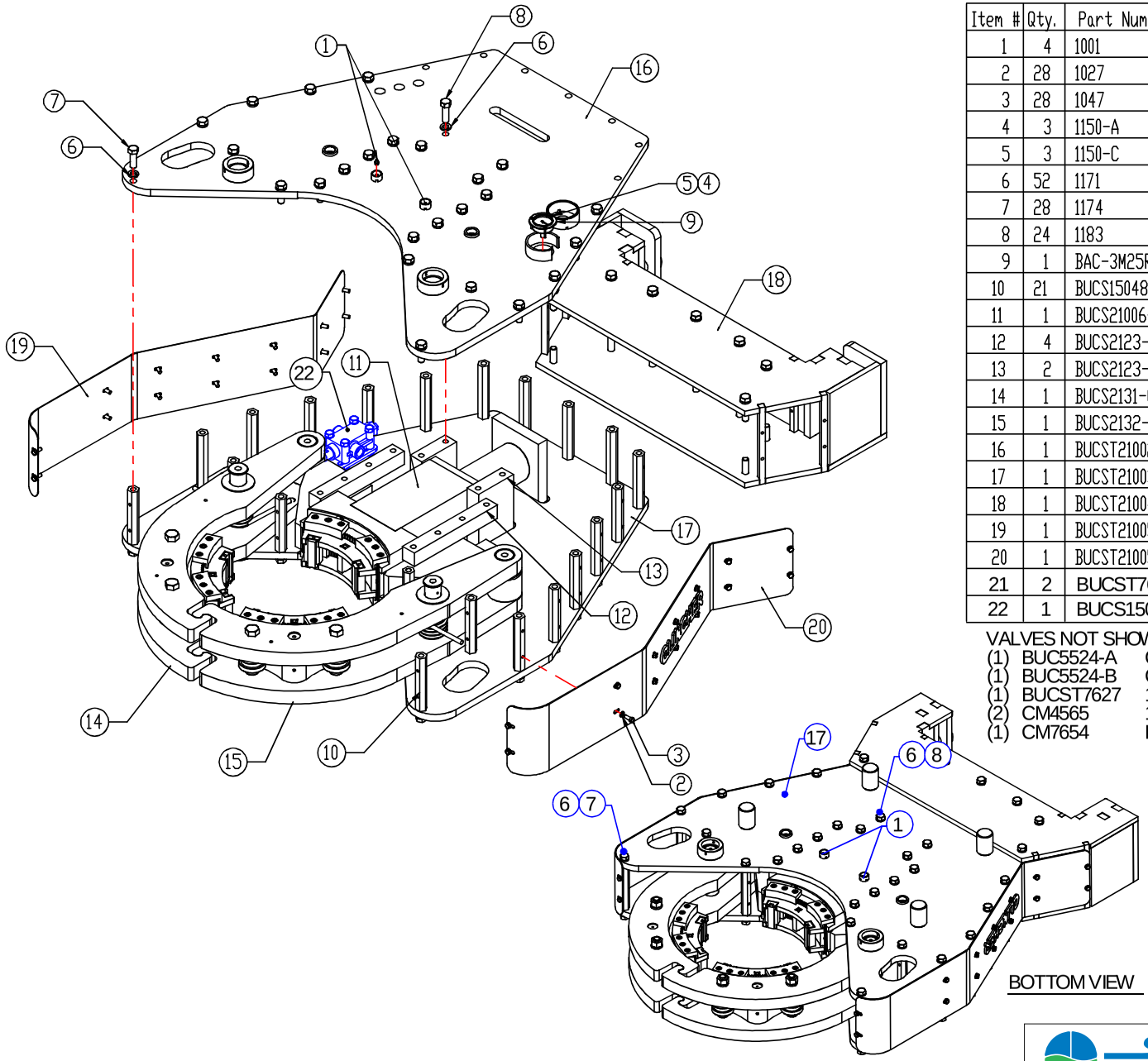

BOTTOM VIEW

Item #	Qty.	Part Number	Part Name
1	4	1001	1/8 NPT ZERT
2	28	1027	WASHER, LOCK 3/8"
3	28	1047	3/8"-16 X 1" HHCS
4	3	1150-A	#6-32 BRASS NUT
5	3	1150-C	#6-32 X 1 1/2" BRASS BOLT
6	52	1171	3/4" LOCKWASHER
7	28	1174	3/4"-10 X 2 1/4" HHCS
8	24	1183	3/4"-10 x 2 1/2 HHCS
9	1	BAC-3M25RCFF	GAUGE
10	21	BUCS15048	BACKUP COLUMN
11	1	BUCS21006-01	CYLINDER ASSEMBLY
12	4	BUCS2123-01	CYLINDER GUIDES
13	2	BUCS2123-02	CYLINDER GUIDES
14	1	BUCS2131-05	OUTSIDE DOOR ASSEMBLY
15	1	BUCS2132-05	INSIDE DOOR ASSEMBLY
16	1	BUCST21002	21" LJ BACKUP TOP PLATE WELDMENT
17	1	BUCST21003	21" LJ BACKUP BOTTOM PLATE WELDMENT
18	1	BUCST21004	FISHTAIL ASSEMBLY
19	1	BUCST21005L	LEFT COVER WELDMENT
20	1	BUCST21005R	RIGHT COVER WELDMENT
21	2	BUCST7623	1/2" NPT BULKHEAD CONNECTOR
22	1	BUCS15067	HI-PSI CAM SWITCH VALVE ASSY.

VALVES NOT SHOWN:

(1)	BUC5524-A	CHECK VALVE CARTRIDGE
(1)	BUC5524-B	CHECK VALVE BODY
(1)	BUCST7627	1/2" P.O. RELIEF VALVE
(2)	CM4565	1/4" NPT CHECK VALVE
(1)	CM7654	PSI REDUCING VALVE

21" DP LJ TENSION STYLE BACKUP

BUCST21000

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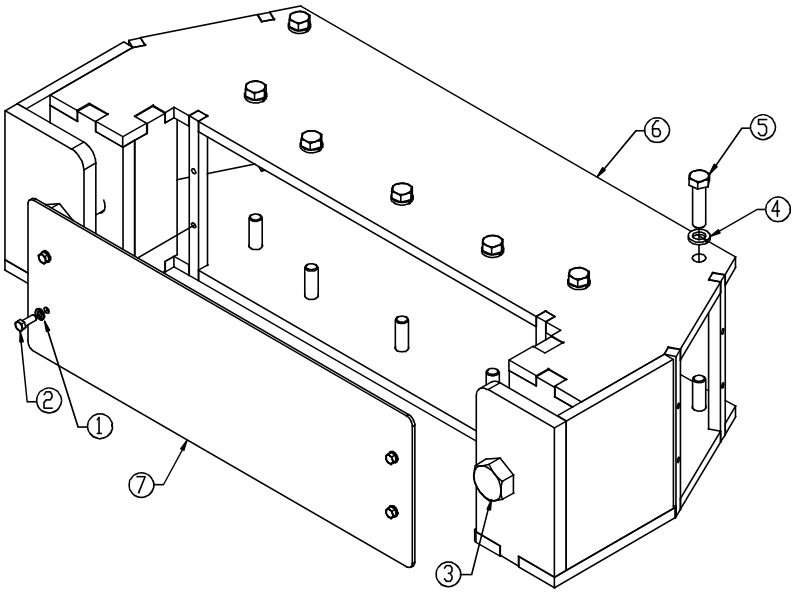
FISH TAIL ASSEMBLY

ASSEMBLY NO. BUCST21004

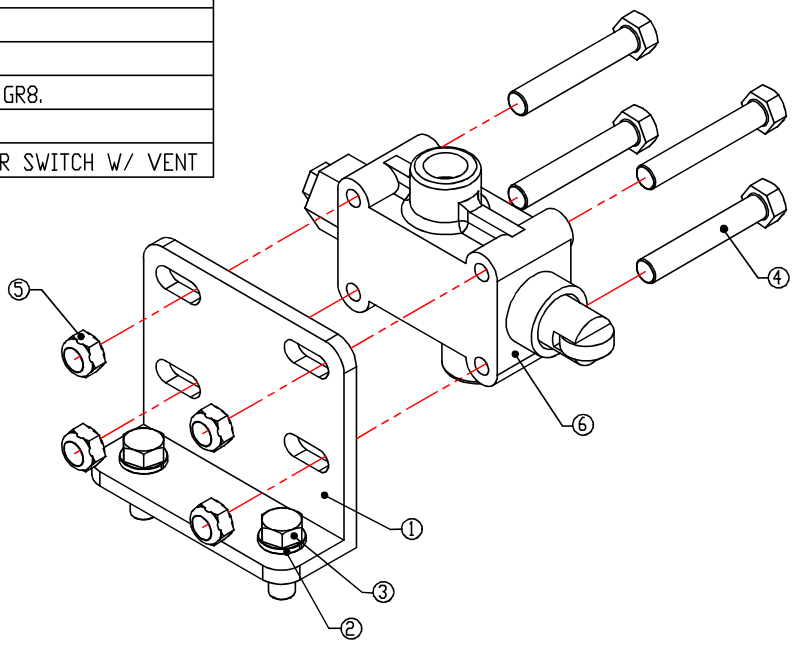


Item #	Qty.	Part Number	Part Name
1	4	1027	3/8" LOCKWASHER
2	4	1047	3/8"-16 X 1" HHCS
3	2	1139	1 1/2"-6 X 6" HHCS
4	14	1171	3/4" LOCKWASHER
5	14	1176	3/4"-10 X 3" HHCS
6	1	BUCST21001	FISHTAIL WELDMENT
7	1	BUCSt21006	REAR COVER PLATE

HI PSI CAM SWITCH VALVE ASSEMBLY

ASSEMBLY NO. BUCS15067

Item #	Qty.	Part Number	Part Name
1	1	10056	CAM SWITCH MTG BRKT
2	2	1027	WASHER, LOCK 3/8"
3	2	1047	3/8-16 x 1 HHCS GR.8
4	4	143	3/8-16 x 2 1/4 HHCS GR8.
5	4	213	3/8-16 NYLOC NUT
6	1	SLV1000-04	NORMALLY CLOSED DOOR SWITCH W/ VENT



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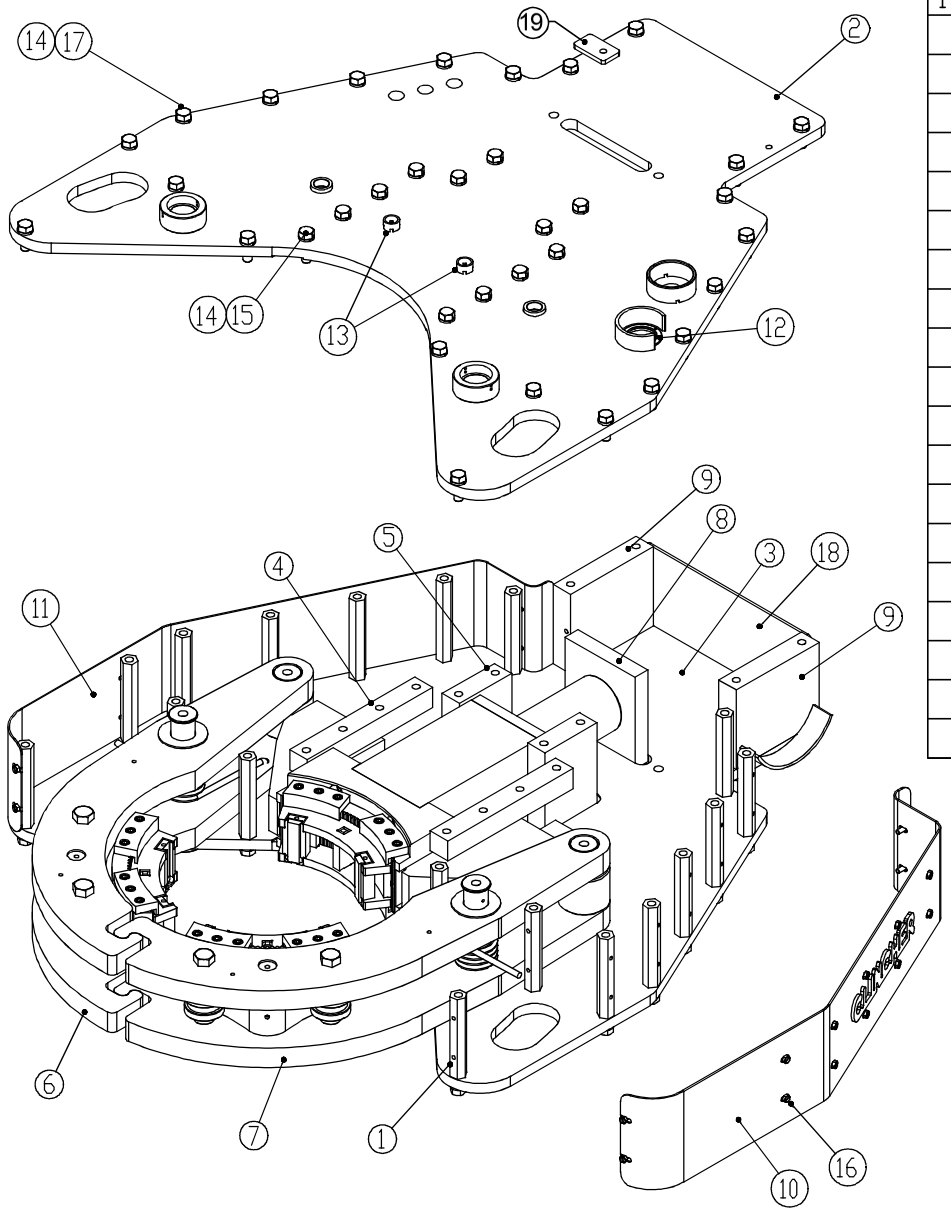

Item #	Qty.	Part Number	Part Name
1	18	BUCS15048	BACKUP COLUMN
2	1	BUCS2101-06	21" LJ BACKUP TOP PLATE WELDMENT
3	1	BUCS2102-06	21" LJ BACKUP BOTTOM PLATE WELDMENT
4	4	BUCS2123-01	CYLINDER GUIDES
5	2	BUCS2123-02	CYLINDER GUIDES
6	1	BUCS2131-05	OUTSIDE DOOR ASSEMBLY
7	1	BUCS2132-05	INSIDE DOOR ASSEMBLY
8	1	BUCS21006-01	CYLINDER ASSEMBLY
9	2	BUCS21026	LOAD CELL THRUST PLATE WELDMENT
10	1	BUCS21035-R	RIGHT COVER WELDMENT
11	1	BUCS21035-L	LEFT COVER WELDMENT
12	1	BAC-3M25RCFF	GAUGE
13	4	1001	1/8 NPT ZERT
14	70	1171	3/4" LOCKWASHER
15	24	1183	3/4"-10 x 2 1/2 HHCS
16	28	1308	HHCS 3/8-16 X 3/4 SLOTTED SELF TAPPING
17	44	1190	3/4"-10 X 2" HHCS
18	1	BUCS2230	REAR COVER PLATE
19	1	BUCS21036	LOAD CELL RETAINER

21" LOCKJAW™ BACKUP ASSEMBLY

BUCS21000-06

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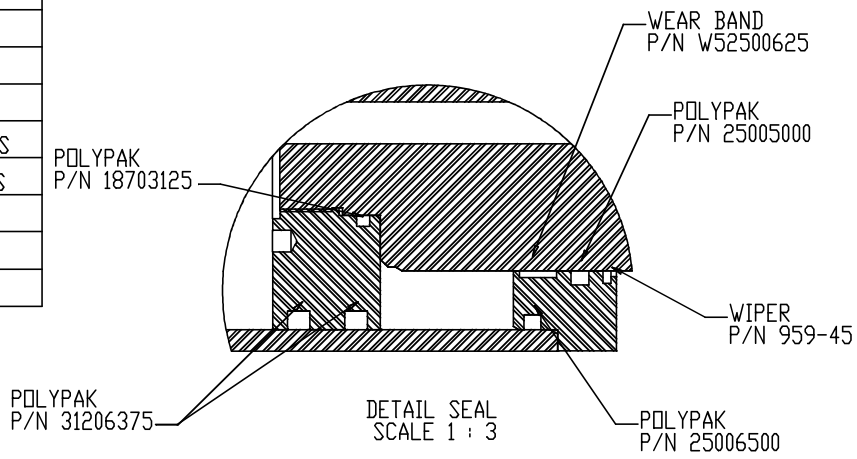
REF: P:\Manuals\Equip Manuals\Dwgs\BUCS21000-06\Assembly.wpg

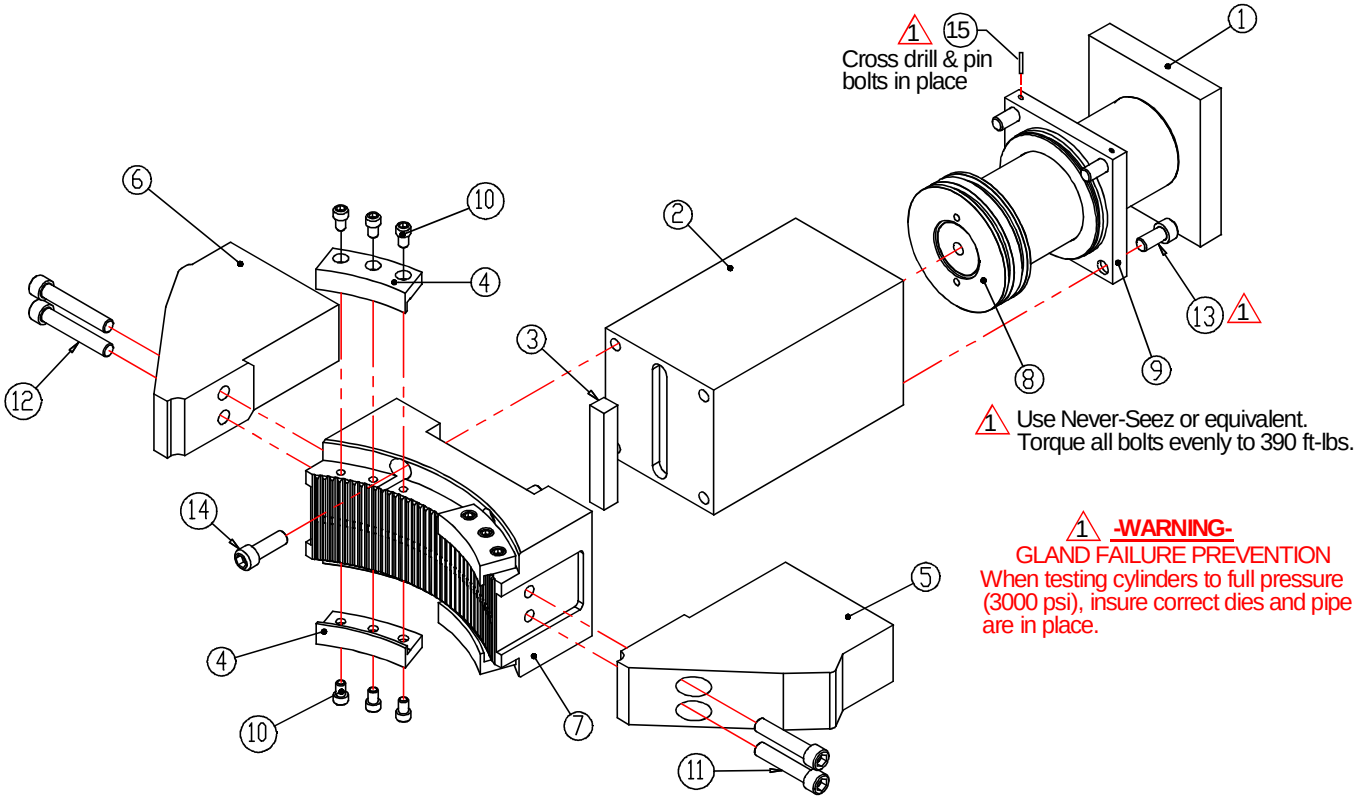
Item #	Qty.	Part Number	Part Name
1	1	BUCS15008	ROD WELDMENT
2	1	BUCS15034	CYLINDER
3	1	BUCS15035	CYLINDER KEY
4	4	BUCS2109	CLIP
5	1	BUCS21017	OUTSIDE DOOR WEDGE
6	1	BUCS21019	INSIDE DOOR WEDGE
7	1	BUCS21033-01	CYLINDER JAW
8	1	CLE18504	PISTON
9	1	CLE18511	GLAND
10	12	245	1/2-13 x 3/4 SHCS
11	2	1281	3/4"-10 X 3 3/4" SHCS
12	2	1239	3/4"-10 X 4 1/2" SHCS
13	4	1171-B	3/4-10 x 1 1/2 SHCS
14	4	1277	3/4-10 x 2 1/4 SHCS
15	4	1005-A ⚠1	3/16" x 1/2" ROLL PIN

STROKE = 9.800"

*NOTE: BUCS2120 USED AS TOP CLIP FOR 20" DIE ADAPTER; ALL OTHERS USE BUCS2109 AS SHOWN



COMPONENTS ARE INCLUDED IN SEAL KIT P/N ASAP2350



⚠1 Use Never-Seez or equivalent. Torque all bolts evenly to 390 ft-lbs.

⚠1 **-WARNING-**
GLAND FAILURE PREVENTION
When testing cylinders to full pressure (3000 psi), insure correct dies and pipe are in place.

CYLINDER ASSEMBLY

ASSEMBLY NO. BUCS21006-01

Rev.	Date	Description
1	03/04/08	Added Warning regarding gland failure. Added gland bolt torque instructions. Added (4) 1005-A/Roll Pins and pin instructions.

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REV. #	LOG #	DATE
1		03/04/08

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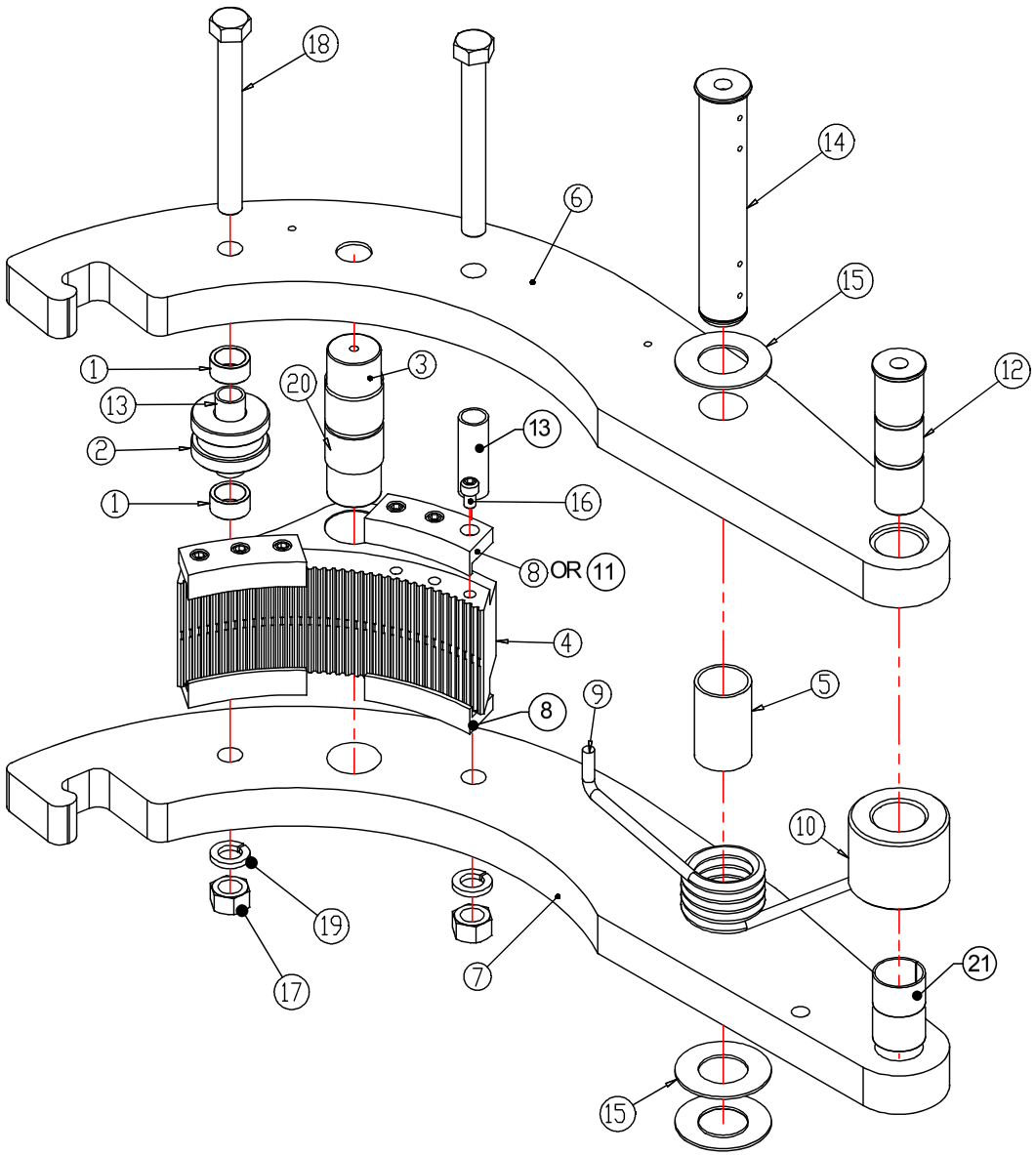

Item #	Qty.	Part Number	Part Name
1	2	BUCDP2154	INSERT SPRING SPACER
2	1	BUCDP9651	PIVOTING INSERT SPRING
3	1	BUCS15009	INSERT PIVOT PIN
4	1	BUCS21020	PIVOTING JAW INSERT
5	1	BUCS21021	DOOR SPACER TUBE
6	1	BUCS2105-05	TOP OUTSIDE DOOR PLATE
7	1	BUCS2106-05	BOTTOM OUTSIDE DOOR PLATE
* 8	4	BUCS2109	CLIP
9	1	BUCS2110	TORSION SPRING LH
10	1	BUCS2112	DOOR ROLLER
* 11	2	BUCS2120	20 " DIE CLIP
12	1	BUCS2133	DOOR ROLLER PIN
13	2	BUCS2138	DOOR SPACER
14	1	BUCS2145	PIVOT PIN
15	3	BUCST7615	PIVOT PIN SPACER
16	12	245	1/2-13 x 3/4 SHCS
17	2	1210	1"-8 NUT GR. 8
18	2	1211-A	1"-8 X 9" HHCS
19	2	1218	1" LW
20	2	36DU28	2 1/4" OD X 1 3/4" LONG GARLOCK
21	2	32DU24	2" x 1 DU BEARING

* NOTE: BUCS2120 USED AS TOP CLIPS FOR 20" DIE ADAPTER; ALL OTHERS USE BUCS2109

OUTSIDE DOOR ASSEMBLY

ASSEMBLY NO. BUCS2131-05

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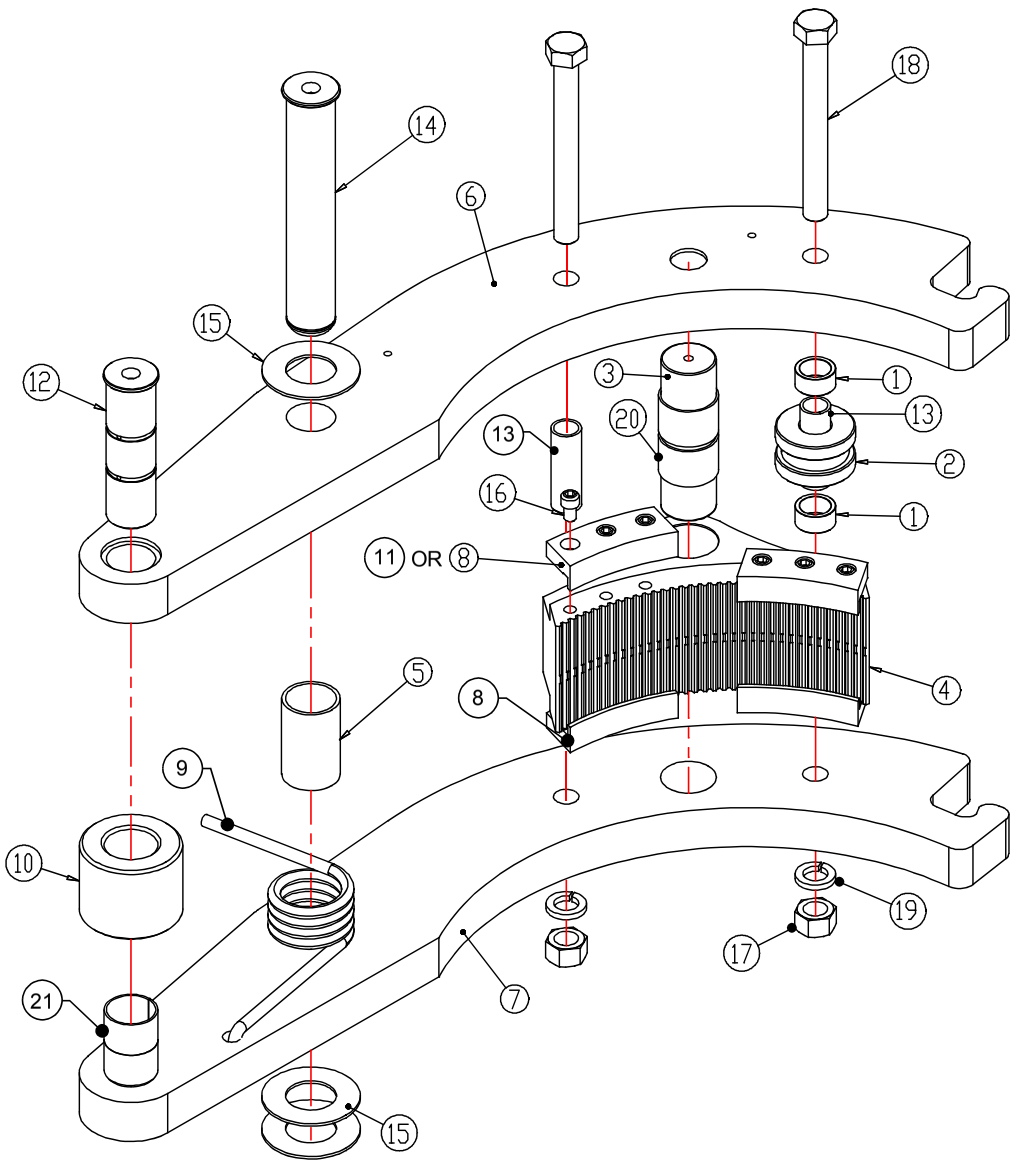
1		08/25/05

REF: S:\Equip Manuals-Dwgs\BUCS2100-05\Door Outside rev1.wpg



INSIDE DOOR ASSEMBLY

ASSEMBLY NO. BUCS2132-05

Item #	Qty.	Part Number	Part Name
1	2	BUCDP2154	INSERT SPRING SPACER
2	1	BUCDP9651	PIVOTING INSERT SPRING
3	1	BUCS15009	INSERT PIVOT PIN
4	1	BUCS21020	PIVOTING JAW INSERT
5	1	BUCS21021	DOOR SPACER TUBE
6	1	BUCS2103-05	TOP INSIDE DOOR PLATE
7	1	BUCS2104-05	BOTTOM INSIDE DOOR PLATE
* 8	4	BUCS2109	CLIP
9	1	BUCS2111	TORSION SPRING RH
10	1	BUCS2112	DOOR ROLLER
*11	2	BUCS2120	20 " DIE CLIP
12	1	BUCS2133	DOOR ROLLER PIN
13	2	BUCS2138	DOOR SPACER
14	1	BUCS2145	PIVOT PIN
15	3	BUCST7615	PIVOT PIN SPACER
16	12	245	1/2-13 x 3/4 SHCS
17	2	1210	1"-8 NUT GR. 8
18	2	1211-A	1"-8 X 9" HHCS
19	2	1218	1" LW
20	2	36DU28	2 1/4" OD X 1 3/4" LONG GARLOCK
21	2	32DU24	2" x 1 DU BEARING

* NOTE: BUCS2120 USED AS TOP CLIPS FOR 20" DIE ADAPTER; ALL OTHERS USE BUCS2109

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(318) 837-8847

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REV. #	LOG #	DATE
1		08/25/05

REF: S:\Equip Manuals-Dwgs\BUCS2100-05\Door Inside rev1.wpg

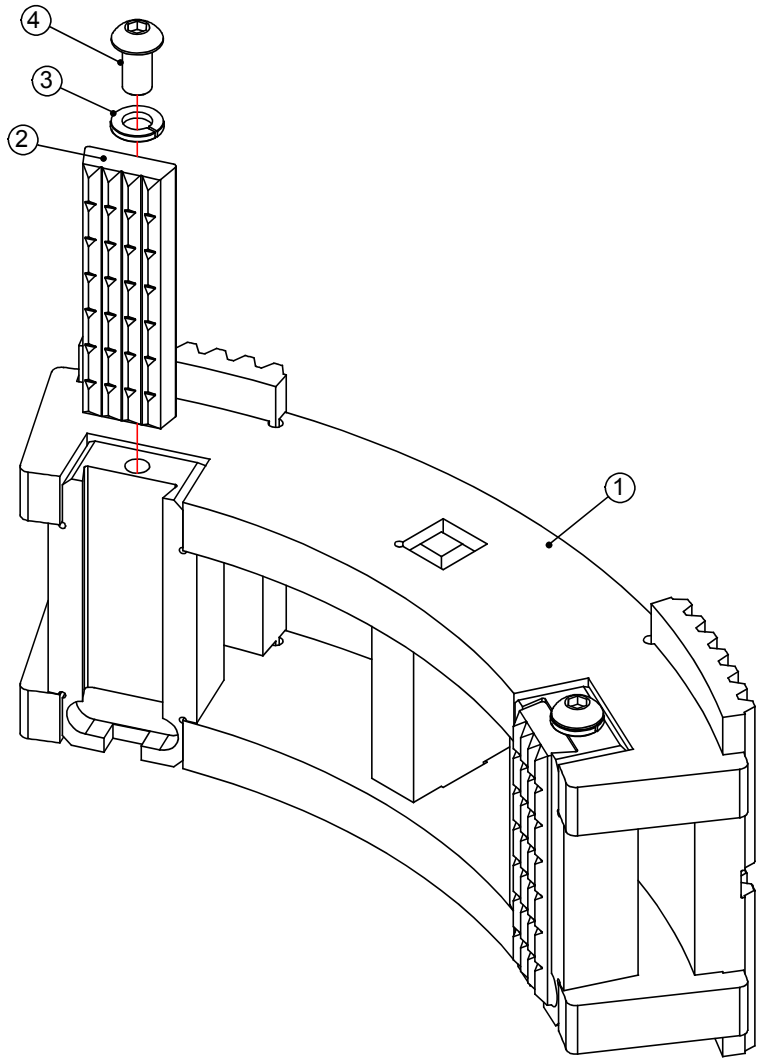
Item #	Qty.	Part Number	Description
1	1	SEE CHART	21" LJ BACKUP DOVETAIL DIE ADAPTER WELDMENT
2	2	DTI1601	1/2" T x 1 1/4" W x 3 7/8" L DOVETAIL INSERT
3	2	1027	3/8" LOCKWASHER
4	2	1061	3/8"-16 x 3/4" BUTTON HEAD CAP SCREW

STANDARD AVAILABLE ADAPTER SIZES

Size	*Die Adapter Assembly Number*	*Adapter Weldment Part Number*
7"	BUDT21-07000A	TBA
7 5/8"	BUDT21-07625A	BUDT21-07625-01
8 5/8"	BUDT21-08625A	TBA
9 5/8"	BUDT21-09625A	TBA
9 7/8"	BUDT21-09875A	BUDT21-09875-01
10 3/4"	BUDT21-10750A	BUDT21-10750-01
11 3/4"	BUDT21-11750A	TBA
11 7/8"	BUDT21-11875A	BUDT21-11875-01
12 7/8"	BUDT21-12875A	BUDT21-12875-01
13 5/8"	BUDT21-13625A	BUDT21-13625-01
14"	BUDT21-14000A	BUDT21-14000-01
14 5/8"	BUDT21-14625A	BUDT21-14625-01
16"	BUDT21-16000A	BUDT21-16000-01
17"	BUDT21-17000A	BUDT21-17000-01

Other sizes available on request.
Order by P/N BUDT21-XXXXXA
Example: 9.770 = P/N BUDT21-09770A

For sizes larger than 17"
See P/N BUDTX21-XXXXXA



21" LJ BACKUP DOVETAIL DIE ADAPTER ASSEMBLY

ASSEMBLY NO. BUDT21-XXXXXA

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		08/25/05
REV. #	LOG #	DATE

REF: S:\Equip Manuals\Dwgs\BUCS21000-06\BUDT21 Adapter DT.wpg

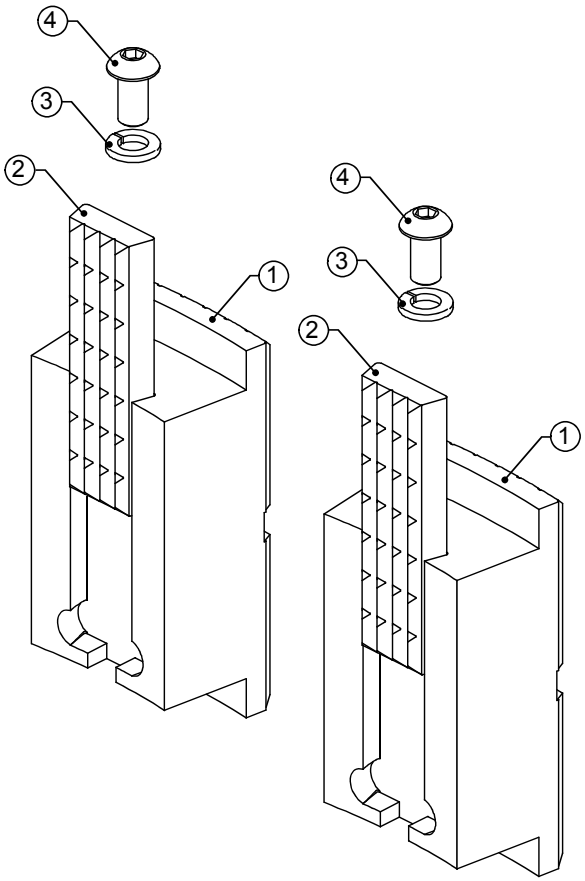
Item #	Qty.	Part Number	Description
1	2	SEE CHART	21" LJ BACKUP DOVETAIL DIE ADAPTER
2	2	DTI1601	1/2" T x 1 1/4" W x 3 7/8" L DOVETAIL INSERT
3	2	1027 • •	3/8" LOCKWASHER
4	2	1061 • •	3/8"-16 x 3/4" BUTTON HEAD CAP SCREW

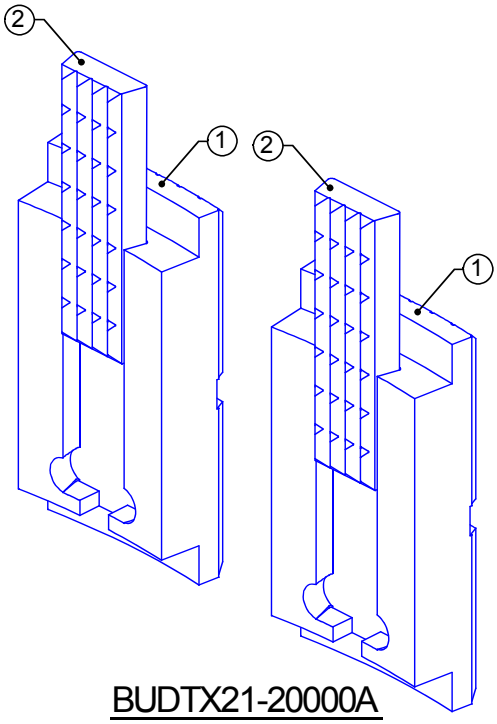
NOTE: • 3/8" SHCS AND LOCKWASHER NOT REQUIRED FOR LARGER SIZES (20"). THE DOVETAIL DIE IS HELD IN PLACE BY THE BACKUP CLIP.

STANDARD AVAILABLE ADAPTER SIZES

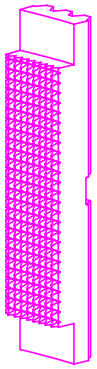
Size	Die Adapter Assembly Number	Adapter Weldment Part Number
17 1/2"	BUDTX21-17500A	TBA
18 5/8"	BUDTX21-18625A	BUDTX21-18625
20"	BUDTX21-20000A	BUDTX21-20000

Other sizes available on request.
Order by P/N BUDTX21-XXXXXA
Example: 19.625 = P/N BUDTX21-19625A





BUDTX21-20000A



SDI21-21000
21" x 21"
FINE TOOTH
STEEL DIE INSERT

21" LJ BACKUP DOVETAIL DIE ADAPTER ASSEMBLY 17 1/2" THRU 20"

ASSEMBLY NO. BUDTX21-XXXXXA

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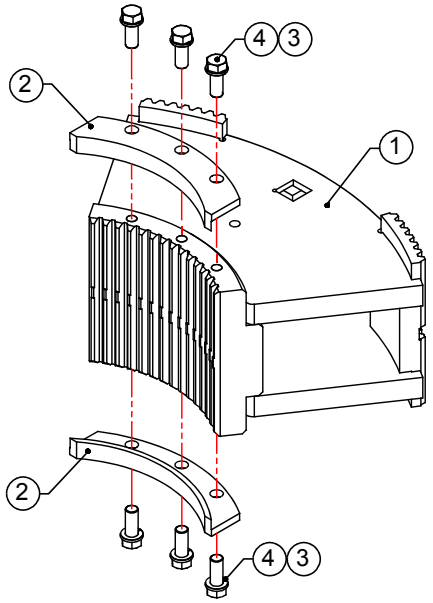
		08/26/05
REV. #	LOG #	DATE

REF: S:\Equip Manuals\Dwgs\BUCS21000-06\BUDTX21_SDI21-21000.wpg

Item #	Qty.	Part Number	Description
1	1	BUA21-08625	21" x 8 5/8" DIE ADAPTER WELDMENT
2	2	CLE18522	RETAINER CLIP
3	6	1027	3/8" LOCKWASHER
4	6	1047	3/8"-16 x 1" HHCS

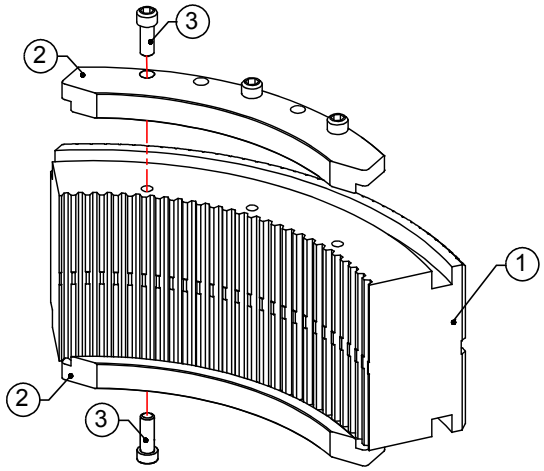
NOTE: DIE RETAINER F/ 7 1/4" - 8" DIES P/N: CLE18522-01
IS ALSO INCLUDED IN THIS ASSEMBLY.



21" x 8 5/8"
SPLINED ADAPTER ASSEMBLY

ASSEMBLY NO. BUA21-08625A

Item #	Qty.	Part Number	Description
1	1	BUCS2146	21" x 15" SPLINED ADAPTER
2	2	BUCST1508	CLIP
3	6	1041	3/8"-16 x 1 1/4" SHCS



21" x 15"
SPLINED ADAPTER ASSEMBLY

ASSEMBLY NO. BUA21-15000A

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		08/26/05
REV. #	LOG #	DATE

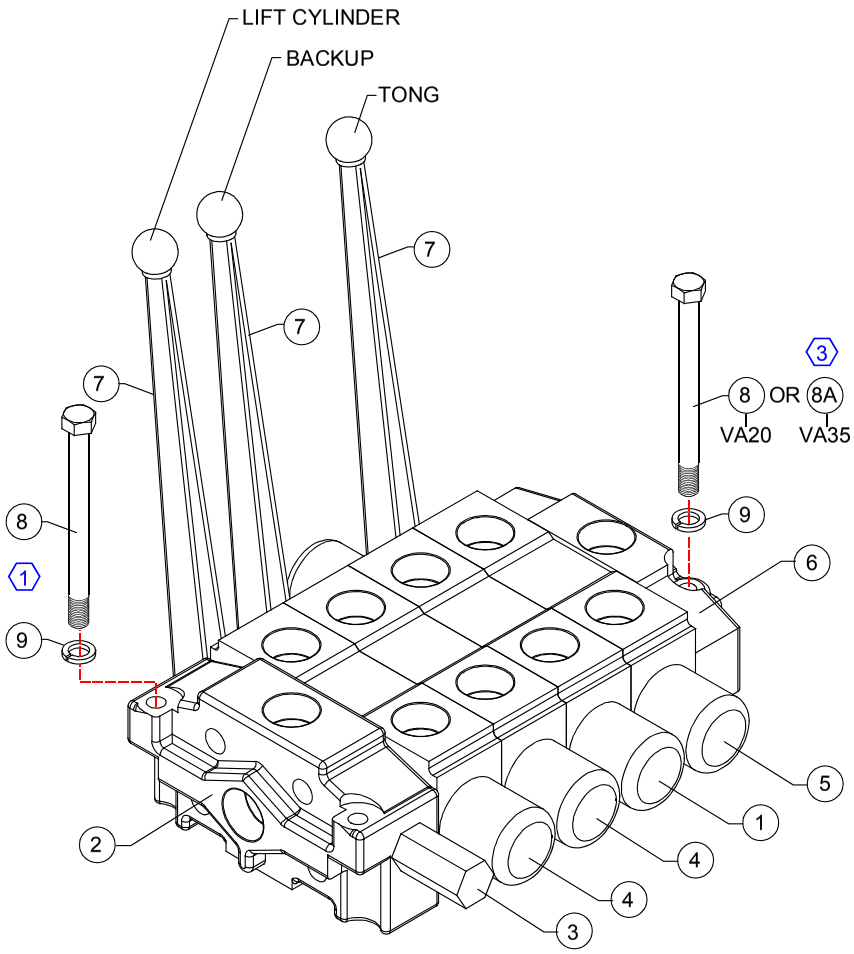
REF: S:\Equip Manuals\Dwgs\BUCS21000-06\BUA21 Adapters.wpg

A20 VALVE BANK ASSEMBLY

Item #	Qty.	Part Number	Description
1	1	55201	CONTROL VALVE ASSEMBLY - MODIFIED VA20-WDA3
			BEFORE 04/15/04
2 OR	1	VA20-MOD	WORK SECTION
			AFTER 04/15/04
2	1	VA20-AA440	INLET VALVE W/O RELIEF
3	1	VA20-MRV-1	RELIEF CARTRIDGE
4	2	VA20-DA3	WORK SECTION
5	1	VA20-MA3	WORK SECTION
6	1	VA20-TR44	OUTLET SECTION
7	3	A20-V1526K-8	A20 8" HANDLE
1 8	3	1072	HHCS 3/8"-16 x 3 3/4" (COMPONENT OF KIT P/N: 4 BANK)
1 9	3	134	LOCKWASHER 3/8" (COMPONENT OF KIT P/N: 4 BANK)

A35 VALVE BANK ASSEMBLY

Item #	Qty.	Part Number	Description
1	1	14213	CONTROL VALVE ASSEMBLY - MODIFIED VA35-WDA4
			BEFORE 04/15/04
2 OR	1	VA35-MOD	WORK SECTION
			AFTER 04/15/04
2	1	VA35-AA440	INLET VALVE W/O RELIEF
3	1	DVG35-HMRV 4	RELIEF CARTRIDGE
4	2	VA35-DA4	WORK SECTION
5	1	VA35-MA4	WORK SECTION
6	1	VA35-TR55	OUTLET SECTION
7	3	A35-V1526K-8	A35 8" HANDLE
1 8	2	X2-40 3	HHCS 1/2"-13 x 4 1/4" 3
3 8A	1	X2-45	HHCS 1/2"-13 x 4 1/2"
1 9 3	3	1103	LOCKWASHER 1/2"



VALVE BANK ASSEMBLY

Rev.	Date	Description
4	08/19/05	Item 3 - Chg.PN from A35-MRV-1 to DVG35-HMRV; ECN#05-0064.
3	12/13/04	Item 8 - Chg. Length from 5" to 4 1/4", PN from X2-79 to X2-40.
		Item 8A - Added Part. Item 9 - Chg. Qty. from 2 to 3.
2	10/21/04	Item 1 - Added VA20-MOD & VA35-MOD for Production after 04/15/04.
1	06/10/02	Item 8 & 9 - Added Part.

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REV. #	LOG #	DATE
4		08/19/05

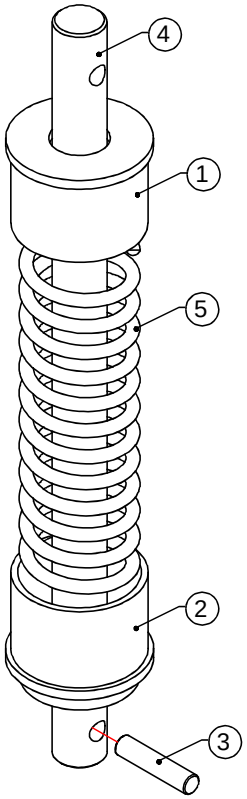
REF: S:\Equip Manuals\Dwgs\Valve Bank 4 rev4.wpg

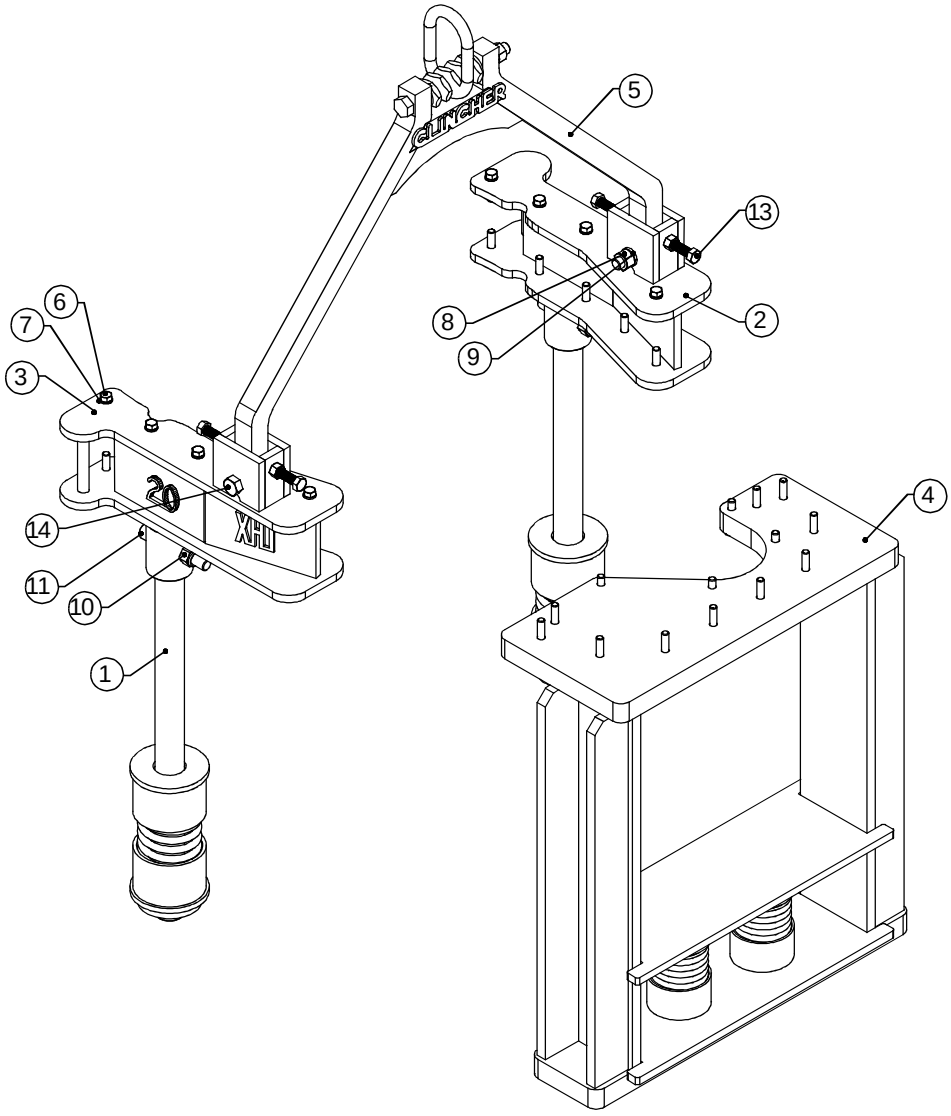
Item #	Qty.	Part Number	Part Name
1	2	MK20006	LEG ASSEMBLY
2	1	MK20013	LEFT HANDLE WELDMENT
3	1	MK20014	RIGHT HANDLE WELDMENT
4	1	RH20002	REAR HANGER ASSEMBLY
5	1	26728	BAIL ASSEMBLY
6	18	202	5/8"-11 X 2 1/2" HHCS
7	18	1151	5/8 LW
8	2	1210	1"-8 NUT GR. 8
9	2	1218	1" LW
10	2	1224-B	1"-8 NYLOC NUT
11	2	1294	1"-8 X 6 1/2" SHCS
12	2	10043	5/32" X 1 1/2" SS COTTER PIN
13	4	73125	3/4" X 4" HHCS
14	2	73127	1" X 5 1/2" HHCS

Item #	Qty.	Part Number	Part Name
1	1	MK20008	TOP SPRING CAP WELDMENT
2	1	MK20009	BOTTOM SPRING CAP WELDMENT
3	1	BUCS15063	LEG POSITION PIN
4	1	MK20007	LEG
5	1	SMH1501-Y	COMPRESSION SPRING

LEG ASSEMBLY

ASSEMBLY NO. MK20006





MOUNTING KIT ASSEMBLY

ASSEMBLY NO. MK20000XHT

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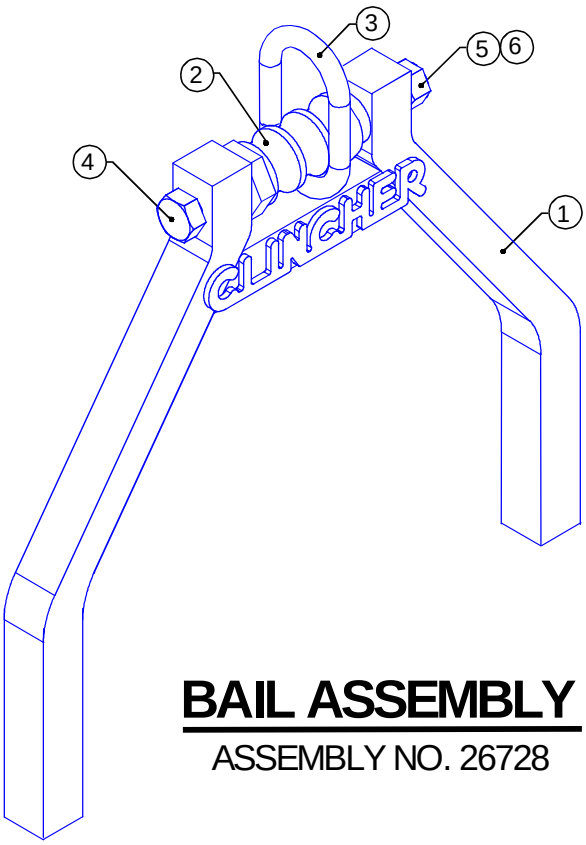
		08/26/05
REV. #	LOG #	DATE

REF: P:\Manuals\Equip Manuals\Dwgs\BUCS21000-06\MK20000XHT.wpg

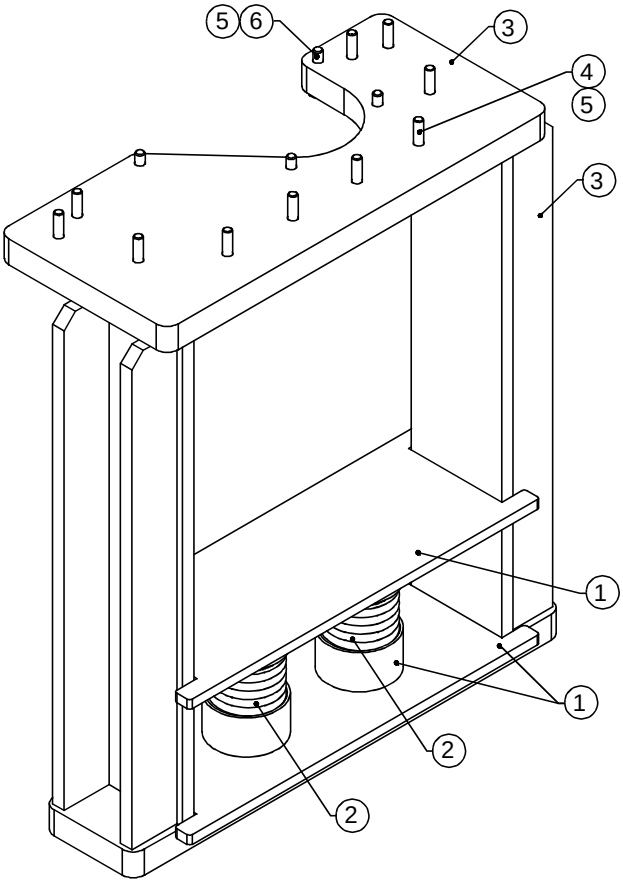
Item #	Qty.	Part Number	Part Name
1	1	26727	BAIL WELDMENT
2	1	73117	BAIL ADJUSTMENT ROLLER
3	1	73118	1" x 2 TON MASTER LINK
4	1	73126	1"-8 x 12" HHCS GR.8
5	1	1218	1" LOCKWASHER
6	1	1210	1"-8 NC HEX NUT



BAIL ASSEMBLY

ASSEMBLY NO. 26728

Item #	Qty.	Part Number	Part Name
1	2	BUCS15056	H-PLATE WELDMENT
2	2	SMH1501-R	SPRINGS
3	1	RH20001	HANGER WELDMENT
4	11	X2-24	5/8"-11 x 4" HHCS
5	15	1151	5/8" LOCKWASHER
6	4	204	5/8"-11 x 3" HHCS



REAR HANGER ASSEMBLY

ASSEMBLY NO. RH20002

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		08/26/05
REV. #	LOG #	DATE

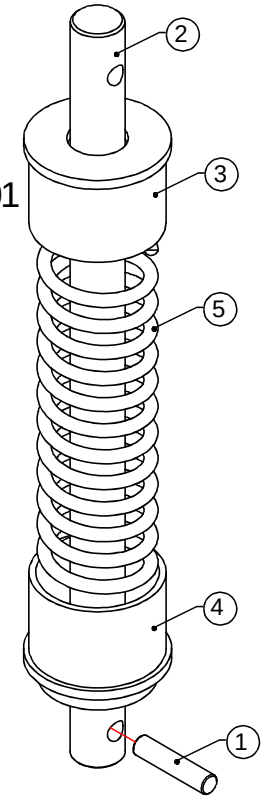
REF: P:\Manuals\Equip Manuals\Dwgs\BUCS21000-06\RH200002_26728.wpg

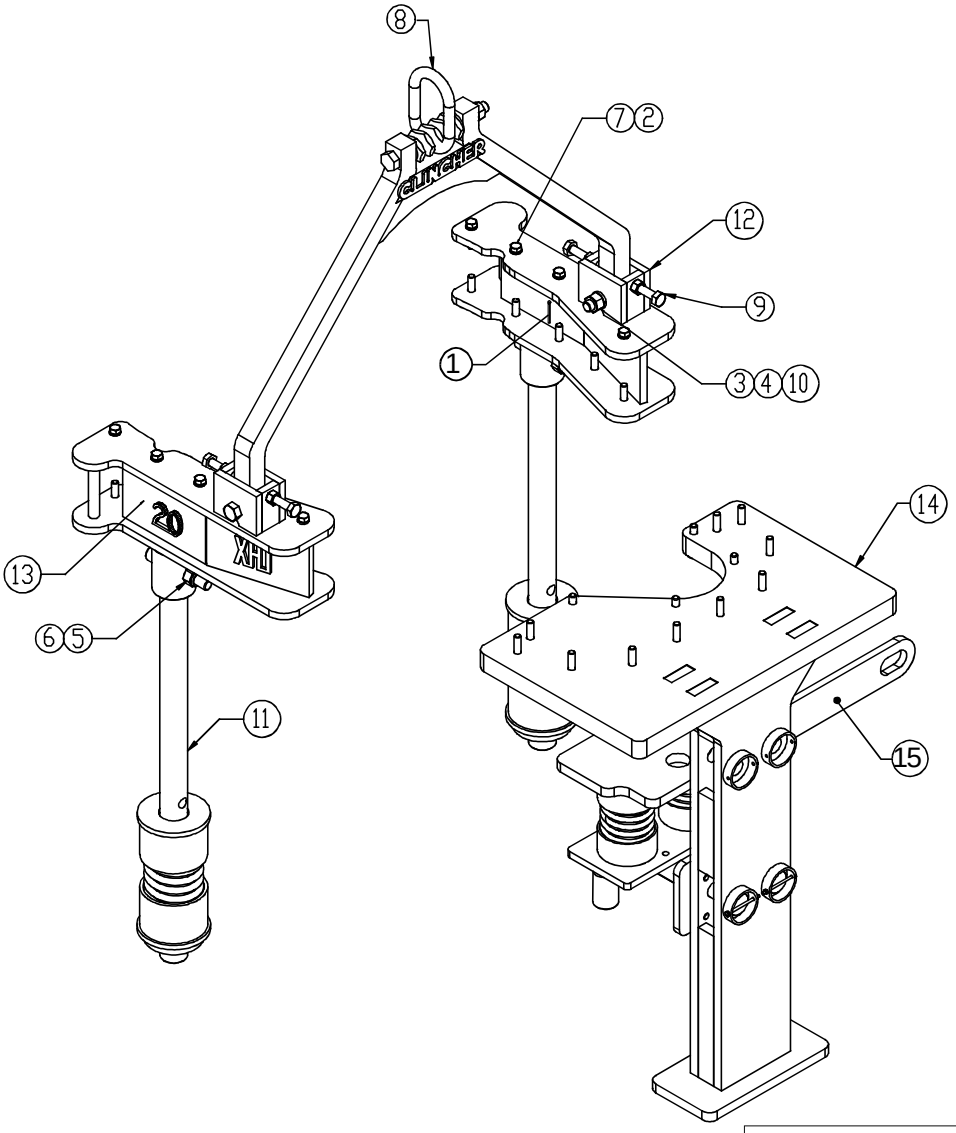
Item #	Qty.	Part Number	Part Name
1	2	10043	5/32" X 1 1/2" SS COTTER PIN
2	20	1151	5/8 LW
3	2	1210	1"-8 NUT GR. 8
4	2	1218	1" LW
5	2	1224-B	1"-8 NYLOC NUT
6	2	1294	1"-8 X 6 1/2" SHCS
7	20	202	5/8"-11 X 2 1/2" HHCS
8	1	26728	BAIL ASSEMBLY
9	4	73125	HHCS 3/4"-10 X 4" GR 8 FULL THREADS
10	2	73127	1" X 5 1/2" HHCS
11	2	MK20006-01	LEG ASSEMBLY
12	1	MK20013	LEFT HANDLE WELDMENT
13	1	MK20014	RIGHT HANDLE WELDMENT
14	1	RH21000	REAR HANGER ASSEMBLY
15	1	BUCST15009	BREAKOUT BAR

Item #	Qty.	Part Number	Part Name
1	1	BUCS15063	LEG POSITION PIN
2	1	MK20007-01	LEG
3	1	MK20008	TOP SPRING CAP WELDMENT
4	1	MK20009	BOTTOM SPRING CAP WELDMENT
5	1	SMH1501-Y	COMPRESSION SPRING

LEG ASSEMBLY

ASSEMBLY NO. MK20006-01





MOUNTING KIT ASSEMBLY

ASSEMBLY NO. MKBUCST21000

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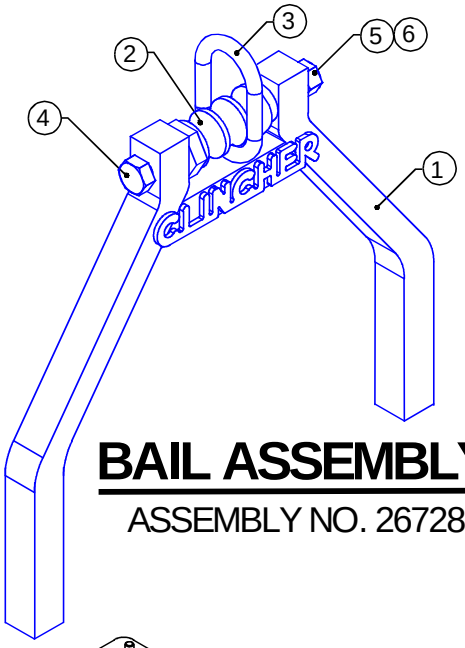
		02/12/07
REV. #	LOG #	DATE

REF: P:\Manuals\Equip Manuals\Dwgs\BUCST21000\MKBUCST21000.wpg

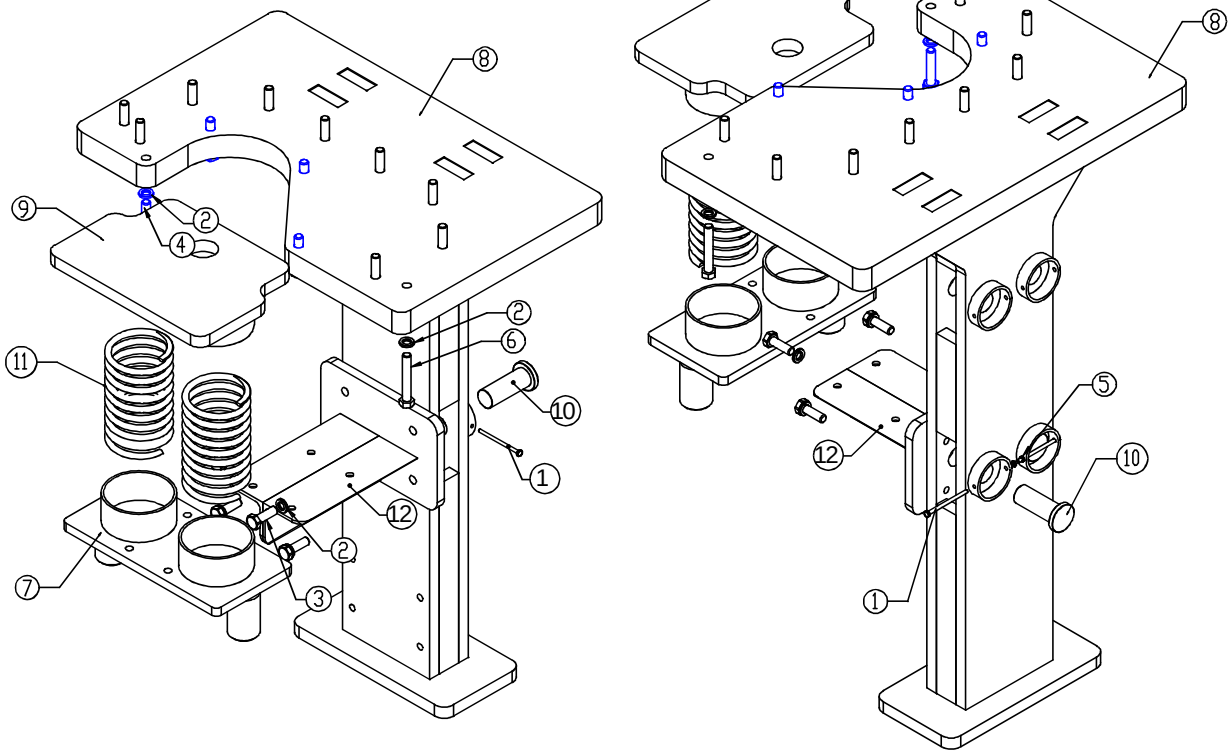
Item #	Qty.	Part Number	Part Name
1	1	26727	BAIL WELDMENT
2	1	73117	BAIL ADJUSTMENT ROLLER
3	1	73118	1" x 2 TON MASTER LINK
4	1	73126	1"-8 x 12" HHCS GR.8
5	1	1218	1" LOCKWASHER
6	1	1210	1"-8 NC HEX NUT



BAIL ASSEMBLY

ASSEMBLY NO. 26728

Item #	Qty.	Part Number	Part Name
1	2	115	1/4"-20 X 3 1/2" HHCS GR8
2	18	1151	5/8 LW
3	4	1160	5/8-11 x 2 HHCS
4	4	204	5/8"-11 X 3" HHCS
5	2	212	1/4-20 NYLOCK NUT
6	10	X2-24	5/8"-11 X 4" HHCS
7	1	RH15009	LOWER SPRING RETAINER WELDMENT
8	1	RH21001	HANGER WELDMENT
9	1	RH21002	UPPER SPRING RETAINER WELDMENT
10	2	RH21003	LINE PULL LOAD CELL HANGER PIN
11	2	SMH1501-R	COMPRESSION SPRING
12	1	RH15012	LOWER SPRING RETAINER WELDMENT



REAR HANGER ASSEMBLY

ASSEMBLY NO. RH21000

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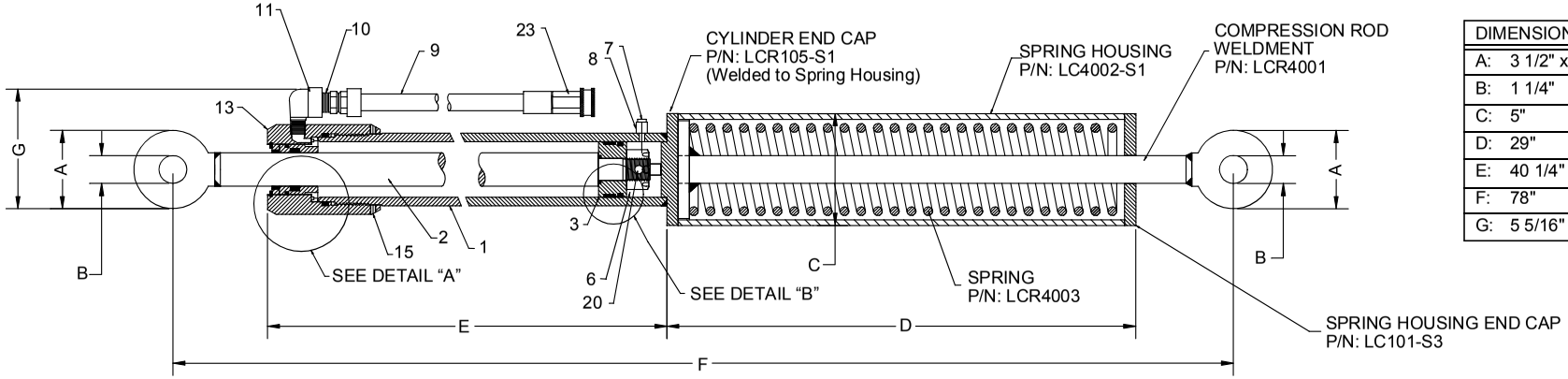
		02/12/07
REV. #	LOG #	DATE

REF: P:\Manuals\Equip Manuals\Dwgs\BUCST21000\RH21000_26728.wpg

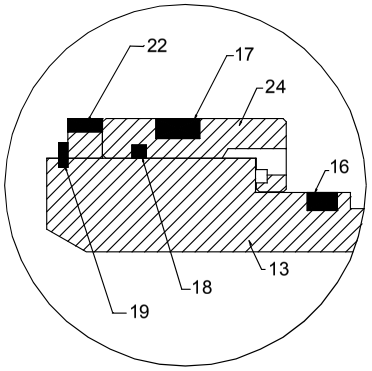


DIMENSIONAL DATA
A: 3 1/2" x 3/4"
B: 1 1/4"
C: 5"
D: 29"
E: 40 1/4"
F: 78"
G: 5 5/16"

• •SEAL KIT P/N: ASAP100

BILL OF MATERIALS

Item	Qty.	Description	P/N
1	1	HYD/AIR CYLINDER BARREL	LCR105
2	1	CYLINDER ROD WELDMENT	LCR112
3	1	PISTON	LCR106
• • 4	1	WEARBAND	W25000500
• • 5	1	POLYPACK 2 1/8" x 2 1/2" x 3/16"	18702125
6	1	1"-12 SLOTTED HEX NUT	1209
7	1	1/2" FLUSH PLUG W/ 1/8" ORIFICE	1657
8	1	1/2" HALF COLLAR	1380
9	1	1/2" x 120" HOSE ASSY. MNPT x FJIC SWVL	LCR107-A
10	1	3/8" MNPT x 1/2" MJIC ADAPTER	1466
11	1	3/8" STREET EL W/ORIFICE	LCR109
12	---	----------	----------
13	1	GLAND CAP	LCR119
14	---	----------	----------
15	2	1/4"-20 x 3/8" SET SCREW	1015
• • 16	1	O RING 2 7/8"ID, 3 1/4"OD, 3/16"W	2-336
• • 17	1	POLYPACK 1 1/2" x 1 7/8" x 3/8"	18701500-375
• • 18	1	O RING 2"ID, 2 1/4"OD, 1/8"W	2-226
19	1	INTERNAL SNAP RING (N-1300-225)	1947
20	1	1/4" x 1 1/2" ROLL PIN	1008-A
• • 21	1	O RING 1"ID, 1 1/4"OD, 1/8"W	2-214
• • 22	1	SEAL NP CR14938	CR14938
23	1	QUICK DISCONNECT 1/2" FEMALE SNAPTITE	1430
24	1	GLAND	LCR113



DETAIL "A"
SCALE: 3X

SPECIFICATIONS - B

MAXIMUM SPRING TRAVEL (PRELOAD TO SOLID) ..... 5.449 in.

AVAILABLE SPRING TRAVEL AFTER PICKING UP TONG (LOADED HEIGHT TO SOLID) ..... 3.00 in.

MAXIMUM ALLOWABLE LOAD (SPRING FULLY COMPRESSED) ..... 7,908 lbs.

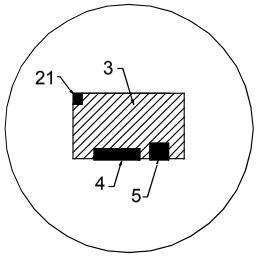
PRESSURE REQUIRED TO LIFT MAXIMUM ALLOWABLE LOAD ..... 2,519 psi

MAXIMUM ALLOWABLE INTERNAL PRESSURE ..... 3,000 psi

CYLINDER I.D. ..... 2.50 in.

ROD O.D. ..... 1.50 in.

STROKE ..... 34.94 in.



DETAIL "B"
SCALE: 3X

LIFT CYLINDER ASSEMBLY

ASSEMBLY NUMBER LCR400-A

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

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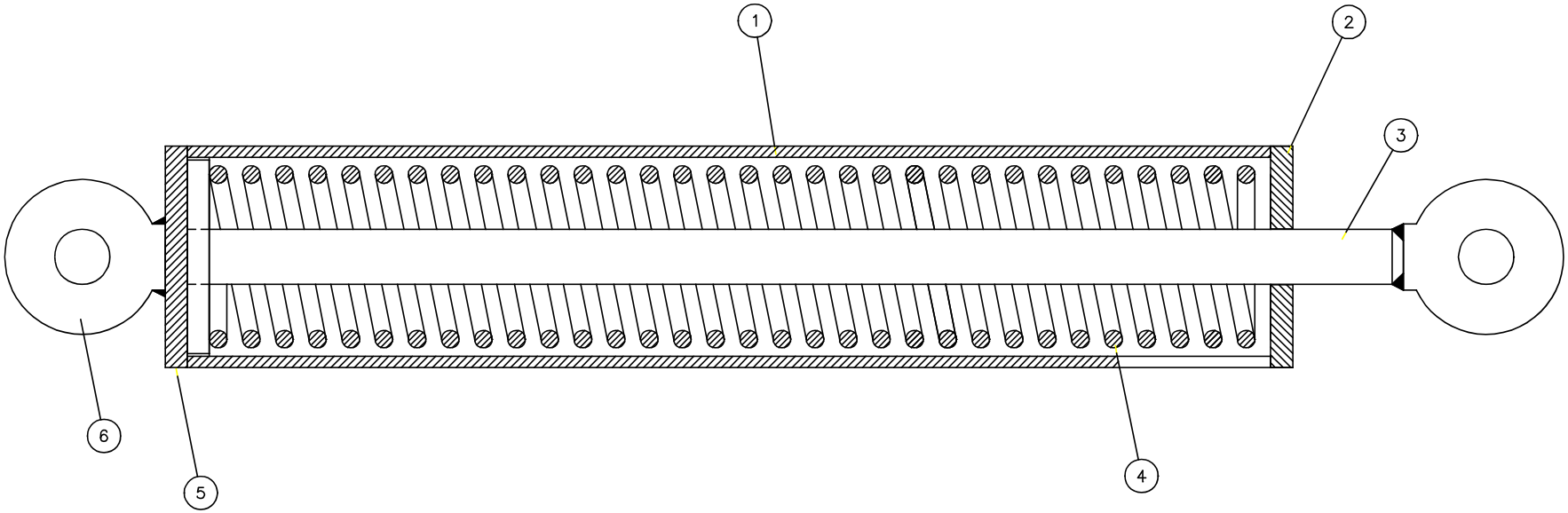
		02/18/03
REV. #	LOG #	DATE

REF: S:\Equip Manuals\Dwgs\LCR\LCR400-A.wpg

Item No.	Qty.req.	Description	Part No.
1	1	SPRING HOUSING	LCR4002–S1
2	1	SPRING HOUSING END CAP	LC101–S3
3	1	COMPRESSION ROD	LCR4001
4	1	COMPRESSION SPRING	LCR4003
5	1	SPRING HOUSING END CAP	LCR101–S2
6	1	ROD EYE	LCR112–S1
7	1	CLINCHER NAME	55044–S5



Rev.#	By	Log#	Description of Revision
6			
5			
4			
3			
2			
1			

1/8 LS STAMP P/N & W.O ON NON-CRITICAL SURFACE

X TAG P/N & W.O

ETCH P/N & W.O ON NON-CRITICAL SURFACE

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE R6

2 PLACE DEC. ±.020	3 PLACE DEC. ±.005	FRACTIONS ± 1/16	ANGLES ± .5°	SURFACE 250	FLATNESS AR PL. ± .015 per foot

1. Dimensions are in inches
2. Remove burrs & sharp edges with 1/64x45°max.
3. Machined fillet radii are 1/32
4. Normality,Squareness & parallelism of machine surfaces are .002 per inch, to a max of .012 inches for a single surface.
5. Machine diameters on a common centerline must be concentric within .005 T.I.R & unmachined diameters concentric within .032 T.I.R

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1 =Revision No. X =STAMP,ETCH,TAG =Machine Zero

1.000 = Critical Dimension 100% Inspection Required

SHEET 1 of 1

SUPERIOR Manufacturing & Hydraulics

4225 HWY.90 E
BROUSSARD,LA 70518
(318)837–8847

PART NAME: SPRING HANGER

PART #: SH400A

DRAWN BY: C CLAXTON

APPROVED BY: DAN B

CHK BY: DATE: 4/27/04

REF: F:\DWG\SH400A.DWG

MATERIAL SPECIFICATION

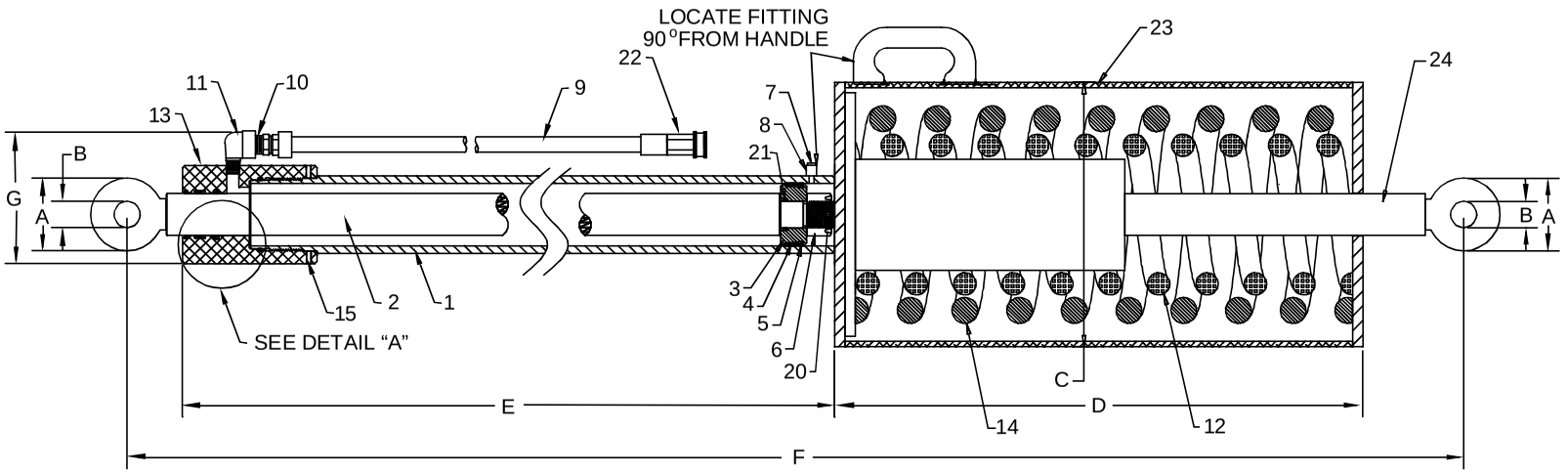
Matl.Req:

Initial Condition:

Alternate Matl:

H.T Instructions: Case Depth:

P:\Manuals\Equip Manuals\Dwgs\CLE2000-07\SH400A.wpg

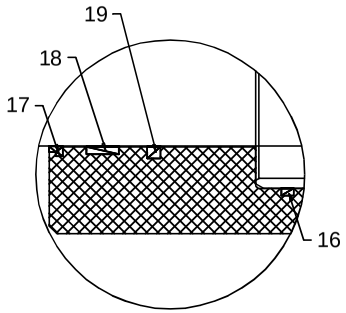


DIMENSIONAL DATA
A: 3 1/2" x 3/4"
B: 1 1/4"
C: 12 3/4"
D: 25 1/2"
E: 41 1/2"
F: 74.550"
G: 6 3/8"

★ SEAL KIT P/N: ASAP300

BILL OF MATERIALS

	Item	Qty.	Description	P/N
	1	1	HYD/AIR CYLINDER BARREL	LCR122
	2	1	CYLINDER ROD WELDMENT	LCR118
	3	1	PISTON	LCR121
★	4	1	WEARBAND	W30000500
★	5	1	POLYPACK 2 5/8" x 3" x 3/16"	18702625
	6	1	1 1/4"-12 SLOTTED NUT	1381
	7	1	1/2" NPT FLUSH PLUG W/ 1/8" ORIFICE	1657
	8	1	1/2" HALF COLLAR	1380
	9	1	1/2" x 120" HOSE ASSY. MNPT x FJIC SWVL	LCR107-A
	10	1	3/8" MNPT x 1/2" MJIC STR. ADAPTER	1466
	11	1	3/8" MOD. STREET EL W/ORIFICE	LCR109
	12	1	LIFT CYLINDER SPRING	SMH2000
	13	1	GLAND	LCR123
	14	1	LIFT CYLINDER SPRING	SMH2001
	15	2	1/4"-20 x 1/2" SET SCREW	1019
★	16	1	O RING 3 3/8"ID, 3 5/8"OD, 1/8"W	2-237
★	17	1	WIPER	959-21
★	18	1	WEARBAND	W22500500
★	19	1	POLYPACK 2" x 2 3/8" x 3/16"	18702000
	20	1	1/4" x 2" ROLL PIN	1009B
★	21	1	O RING 1 1/4"ID, 1 1/2"OD, 1/8"W	2-218
	22	1	QUICK DISCONNECT 1/2" FEMALE SNAPTITE	1430
	23	1	SPRING HOUSING ASSEMBLY	LCR501
	24	1	COMPRESSION ROD WELDMENT	LCR502



SPECIFICATIONS

MAXIMUM SPRING TRAVEL (PRELOAD TO STOP TUBE)	11 in.
MAXIMUM ALLOWABLE STATIC LOAD (WITH 6.5" SPRING COMPRESSION STILL AVAILABLE)	7,200 lbs.
MAXIMUM ALLOWABLE LOAD (SPRING FULLY COMPRESSED TO STOP TUBE)	11,500 lbs.
PRESSURE REQUIRED TO LIFT MAXIMUM ALLOWABLE LOAD	2,000 psi
MAXIMUM ALLOWABLE INTERNAL PRESSURE	3,000 psi
CYLINDER I.D.	3 in.
ROD O.D.	2 in.
STROKE	35.640 in.

LIFT CYLINDER ASSEMBLY

ASSEMBLY NUMBER LCR500

SUPERIOR Manufacturing & Hydraulics
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(318) 837-8847

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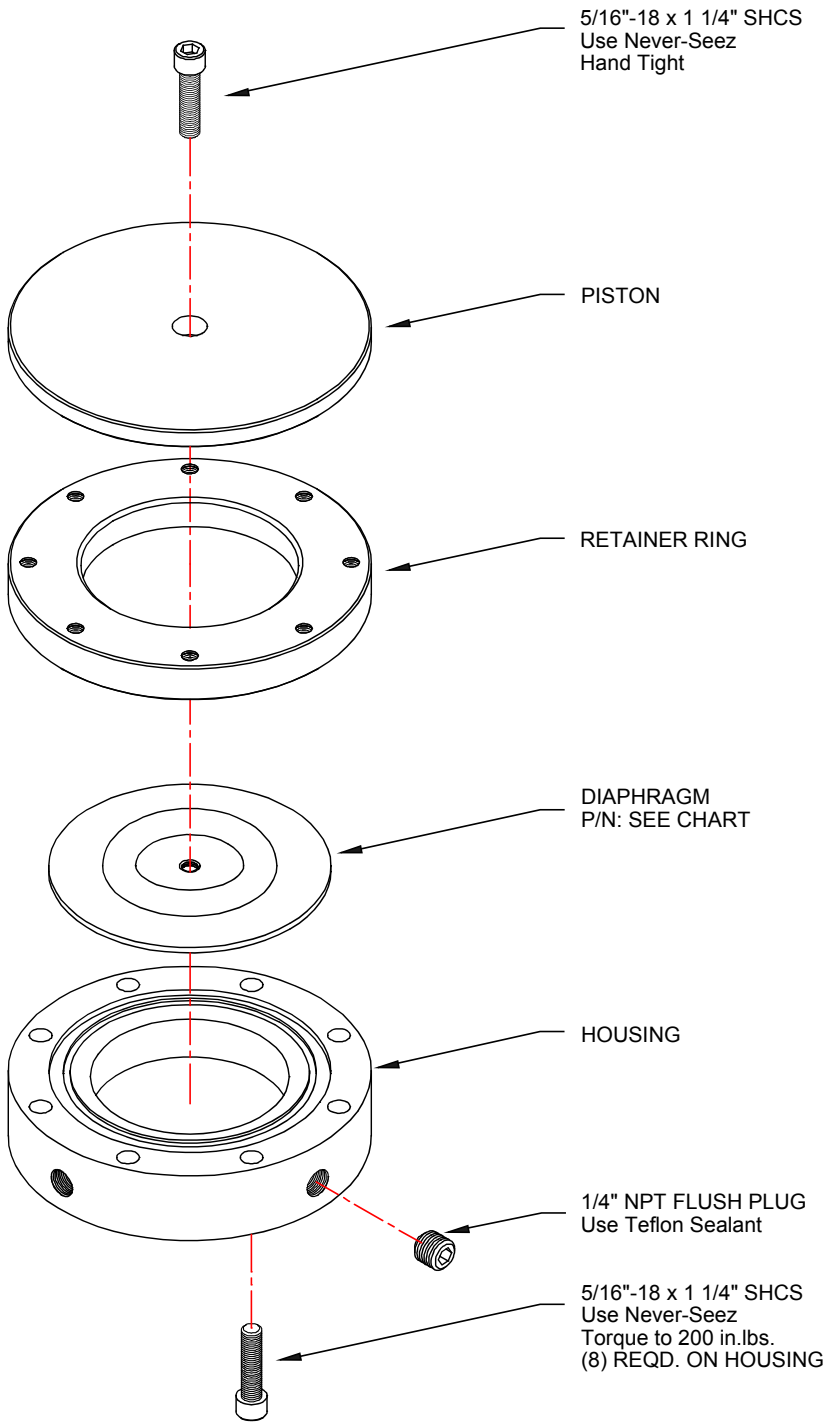
CLINCHER® LOAD CELL and TORQUE GAUGE ASSEMBLIES

The **CLINCHER®** Tong and Backup are available in versions which accommodate compression load cells or tension style load cells. All information contained in this Technical Manual refers to products which utilize compression load cells. Contact SUPERIOR for information concerning products using tension load cells.

Part Number	SM85-48C
Torque Rating	85,000 ft lbs
Handle Length	48 inches
Loadcell Type	Compression
Loadcell Manufacturer	SUPERIOR MANUFACTURING & HYDRAULICS
Torque Gauge Mfr.	**CLINCHER®**
Torque Gauge Size	6"
Assembly Documentation	Calibration Certificate

Part Number	SM85-56-T
Torque Rating	85,000 ft lbs
Handle Length	56 inches
Loadcell Type	Tension
Loadcell Manufacturer	SUPERIOR MANUFACTURING & HYDRAULICS
Torque Gauge Mfr.	**CLINCHER®**
Torque Gauge Size	6"
Assembly Documentation	Calibration Certificate

CLINCHER® Load cells and Torque Gauges are produced by several manufacturers. The information provided by MD TOTCO or Acadiana Oilfield Instruments may not be applicable to all torque gauges or load cells. This reference information is provided with the permission of MD TOTCO and Acadiana Oilfield Instruments.



LOAD CELL SIZE	DIAPHRAGM P/N
6.44 SQ.IN.	CLC203
8.0 SQ.IN.	CLC205
12.0 SQ.IN.	CLC206
16.1 SQ.IN.	CLC207
25.0 SQ.IN.	CLC208

COMPRESSION LOAD CELL

SUPERIOR Manufacturing & Hydraulics
4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

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1		07/03/02
REV. #	LOG #	DATE

REF: S:\Equip Manuals\Dwgs\Load Cell Comp rev1.wpg

To request copy of
Compression Torque System
Technical Manual or AOI Tension
Torque Systems, please contact:

Superior Manufacturing & Hydraulics
4225 Hwy. 90 East
Broussard, LA 70518
Phone: 337-837-8847
Fax: 337-837-8839
www.superior-manf.com

SECTION 13 MOTOR SERVICE MANUALS

To request copy of Rineer Motor Service Manuals, please contact:

Superior Manufacturing & Hydraulics
4225 Hwy. 90 East
Broussard, LA 70518
Phone: 337-837-8847
Fax: 337-837-8839
www.superior-manf.com

SECTION 14 CONTROL VALVE TECHNICAL DATA

To request copy of Control Valve Technical Data, please contact:

Superior Manufacturing & Hydraulics
4225 Hwy. 90 East
Broussard, LA 70518
Phone: 337-837-8847
Fax: 337-837-8839
www.superior-manf.com